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NOTICES.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Institute's New Officers

THE Institute of Chemistry is this year losing by retirement the services of its president, Mr. A. Chaston Chapman, who has held the office since March, 1921, and of its treasurer, Mr. E. W. Voelcker, who was elected to the post in July, 1918. It is understood that Mr. Chaston Chapman will be succeeded in the presidency by Professor G. G. Henderson, Regius Professor of Chemistry in Glasgow University, and that Mr. Voelcker will be succeeded by Professor P. H. Kirkaldy, at one time lecturer and professor in King's College, London.

The Council in their report, to be presented to the annual meeting on Monday next, pay deserved tributes to both. Reference is made to Mr. Chaston Chapman's "able guidance of the affairs of the Institute" and to the "courtesy and wise counsels" by which he has maintained the most cordial goodwill and confidence of his colleagues. His visits to Local Sections and his addresses to students have greatly assisted in cementing the bond of good fellowship which the Council at all times desire to preserve, and as the representative of the Institute on public bodies and all public functions he has done a great deal towards securing fuller recognition for the profession of chemistry. Professor Henderson is well qualified in every sense to carry on the high traditions of the Institute chair. A native of Glasgow, where he was born in 1862, his academical work has been confined to his native city. Outside the lecture room he has taken an active part in administrative work, and has a large experience of work in connection with chemical organisations. For eight years he served as hon. secretary and then as chairman of the Scottish section of the Society of Chemical Industry, and successively he acted as secretary, recorder, and president of Section B (Chemistry) of the British Association. Already he is a vice-president of the Institute, a past-president of the Society of Chemical Industry, and a past vice-president of the Chemical Society. The Institute has for some time been developing its activities outside London, and in the North especially the election of Professor Henderson will be warmly welcomed.

Mr. E. W. Voelcker is retiring from the treasurership for reasons of health. The son of the late Mr. Augustus Voelcker, a well-known agricultural chemist, Mr. Voelcker has followed in his father's footsteps and inherited many of his tastes. Though not a prominent figure at chemical gatherings, he has been an enthusiastic member of the Institute, and has given the keenest attention to its finances. It is, the Council state, in a large measure due to his able management that the financial position of the Institute has been so substantially improved. Professor Kirkaldy will have no special difficulties to face, and may look forward to a pleasant and successful term of office, thanks to the combination of good management and good feeling with which the Institute is blessed.

Reparations Levy Reduced

CHEMICAL TRADERS will cordially welcome the new arrangements respecting the German reparations levy. The reduction of the amount from 26 to 5 per cent. is not really of much account, for so long as the British importer only pays 100 per cent. he is not concerned as to the proportions that go to the British Customs and to the German exporter. The important point is that once more the German Government has undertaken to re-imburse the German exporter the amount paid by his British customer to the British Customs. Since November last the British importer has had to pay the German exporter the full value of his goods and to pay the 26 per cent. levy in addition. Now the original system is restored—5 per cent. to the Customs and .95 per cent. to the German exporter—and the British merchant once more knows where he is and can get on with his business.

The levy, which applied to all German exports to this country, has caused endless annoyance and trouble

to importers, and the revenue from it is probably out of all proportion to the cost and labour of securing it. To make sure of receiving the levy, instructions were given for British importers to deduct the 26 per cent. and pay it to the Customs, the receipt for this payment being considered a good discharge against the German exporter. But since the German Government announced that they could not reimburse their exporters it has been clear that the arrangement could not continue. Under the new system on and after February 26 the importer will continue to pay the 5 per per cent. to the Customs, but in order to guarantee that no part of the levy shall be charged to British importers the German Government have agreed to arrange for the compensation of German exporters at a later date and to make it a punishable offence to charge any of the levy to the British importer. As regards goods imported between November 17 and February 25, the German Government have undertaken to pay the exporter in gold bonds on production of the British Custom receipts, irrespective of the date of the contract under which the sale took place.

Chemical Federation

QUIETLY and systematically, for some considerable time past, the preaching of the gospel of federation has been going on among the leading chemical organisations. The matter has been discussed mostly in secret in order to get some idea of how people feel about it, but it must in the nature of things be considered in the open before any definite action can be taken. A distinct step in advance was taken recently when it was decided to call in a specialist for consultation, and to consider with him how best to proceed. The specialist, it need hardly be said, was that indispensable man Mr. Woolcock, who gave a general blessing to the principle of federation, and upon whom, if he should happen to be the next president of the Society of Chemical Industry, would fall largely the task of converting the principle into practice.

Shortly, the idea is that to begin with, the Chemical Society, the Society of Chemical Industry, and the Institute of Chemistry should be brought into some sort of federal relation. Much, of course, depends on how far into the organisation of each body the federation principle is to go. If it simply means meeting or dining occasionally together there would be little or nothing in the idea beyond the cultivation of the right social spirit; if, however, it means pooling of finances, government by a central cabinet instead of home rule, a practical amalgamation of funds, staffs, rules, management, and so on, the substitution of one organisation for three separate societies, then the change involves questions needing to be very carefully considered. Up to now what appears to be contemplated is something mid-way between these two extremes, but something involving a substantial degree of united action and common authority.

What would be the chief advantages of such a federal arrangement? First, it would be in the fashion. Whether it be churches, or businesses, or societies, the present tendency is to force them into big combines. Size, numbers, influence, all must be big if they are to count. If all the fragments of chemical organisations could be gathered up into one great union, we should at least have something "big" and therefore in the fashion. Secondly, it is inferred that the bigger the federation is the greater would be its influence. Probably that would be so, say, in a deputation to the Government; a spokesman of 15,000 is more impressive than one of 5,000. At the same time it would be important to see that the advantage was not merely spectacular, and that in any joint arrangement the management of the constituent bodies was not less efficient than formerly. Thirdly, there is the unfailing argument of economy—less establishment charges, fewer officials, and so forth. The pressure of finance, however, is not really serious. The Institute's balance sheet looks quite well; one does not hear of the Chemical Society being in any difficulty; the only difficulty in the case of the Society of Chemical Industry is where it has embarked on trading adventures outside its proper functions and found the exchange from the scholar's robes to the tradesman's apron not as profitable as had been hoped. Co-operation might, no doubt, effect economies, but not without some little friction, especially as regards officials, and it would be necessary to watch against the usual risk of efficiency being reduced.

These are the main advantages of the contemplated federation—increased numbers, increased total weight, less duplication of duties, and less cost. It is not likely to be accomplished for some time to come, but some movement towards it must come eventually. The main thing for the moment is to avoid rash moves which may have to be retraced, to go slow and make quite sure of the ground step by step.

Water Softening for Boiler Use

THE Institution of Mechanical Engineers and the Chemical Engineering Group met on common ground on Tuesday in discussing the treatment of water for industrial purposes. The engineer requires water for boiler purposes free at least from dissolved calcium and magnesium salts, and the chemist in response to this need long ago developed methods of producing such water, so that boiler scale and other troubles resulting from "hard" water, can be very largely avoided. With the use of artificially softened water for industrial purposes such as wool washing or paper making more effective methods of treatment have grown up, and existing ones have been improved so that at the present time there is hardly any industry using water in large quantities where it is not advantageous to purify it in some way. The superiority of the French silk industry is stated to be very largely due to the naturally pure water which is available at the works, and even in this case it has been thought worth while at one large French works to instal a Permutit plant to remove the small quantity of salts in the water.

In the case of boiler feed water the advantages are important. If this is hard, say 20° on the Clark scale, then about 3 lb. of scale is deposited in the boiler per 1,000 gallons of water evaporated. The total cost of

softening such water, including interest, depreciation, chemicals and labour is about 6d., while the cost of the coal required to evaporate it is about 12s., assuming a reasonably efficient boiler. Thus the cost of softening is only about 4 per cent. of the fuel cost, and when it is considered that a saving of 10 to 15 per cent. in coal may be obtained by keeping the boiler free from scale the value of softening is obvious. This is apart from the saving effected by avoiding chipping and cleaning out of the boiler, with consequent delay, wear and tear, and other attendant drawbacks. In fact, as far as boiler users are concerned, the question of soft water may be of even greater importance in effecting working economies than the adoption of improved fuel burning devices, and is essential in order that full benefit may be obtained from modern high efficiency furnaces.

Chemists as Directors

THE "Scientist" who occasionally sets out to educate the public through the *Daily Mail* has been explaining to them this week "why Britain lags in chemistry." At a time when we are preparing to show the world that British chemistry does *not* lag, this sort of writing, if not a positive dis-service to chemistry, is at the best not much of a help. On perusal, what it comes down to is the old proposition that the chemist should be a director of companies. Many of them are already, and industry might very well be the better for an increase in their number, but this does not necessarily mean that the chemical or any other type of *doctrinaire*, utterly incapable often of realising the difference between ideals and commercial possibilities, must be allowed to have his way in the management of works. In view of the unfeeling attitude of boards of directors, "it is no wonder," the writer says, "that the ablest scientists resign if they can afford to do so," but presumably not being able to afford the luxury the resignations are confined to one case in, say, five years, with a proper degree of fuss and advertisement. There is another side to the business on which the writer does not touch—the need of chemists who contemplate the board-room as a career qualifying themselves with the necessary knowledge of business and business men. And this they can only do, as we have often pointed out, by getting out of their own groove.

The Dock Strike

THE dock strike was fortunately of short duration but its effects, in the brief period it lasted, were considerable, and they added, as such events are bound to do, to the already heavy handicap on trade. In this matter, the employers cannot be complimented on the manner in which they handled matters, for if a conference could settle the points in dispute after the strike had begun it might reasonably have been tried before it was entered upon. In most of these unfortunate disputes the spirit in which negotiations are conducted is a matter of the first importance, and where the men are met with frankness and a desire for a fair and open-minded discussion the chances of a satisfactory settlement are correspondingly improved.

Points from Our News Pages

A conference was held on Tuesday between the Institution of Mechanical Engineers and the Chemical Engineering Group of the Society of Chemical Industry on "The Treatment of Water for Industrial Purposes," at which a number of important papers were read (p. 214).

Mr. E. V. Evans delivered the first of three Cantor Lectures on Monday on the "Destructive Distillation of Coal" (p. 218).

Other papers reported include the Recovery of Nitrogen from Coal (p. 217) and the Use of Pyrometers in Glass Works (p. 219).

According to our London Market Report business during the week has continued on fairly active lines (p. 224).

Business in the Scottish Chemical Market during the week has shown a marked increase in the number of inquiries (p. 229).

The Calendar

Mar.		
3	Royal Society of Arts (Cantor Lecture): "A Study of the Destructive Distillation of Coal" (Lecture II.) E. V. Evans. 8 p.m.	John Street, Adelphi London, W.C.2.
3	Society of Chemical Industry (London Section): Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, W.1.
3	Society of Dyers and Colourists (Leeds Junior Branch): "Sulphur Dyestuffs." F. L. Goodall.	Leeds.
3	Institution of the Rubber Industry: "Life and Work of Thomas Hancock." Herbert Rogers and B. D. Porritt. 8 p.m.	Engineers' Club, Coventry Street, London.
3	Society of Chemical Industry Newcastle Section): Joint meeting with the Cleveland Institution of Engineers and the Newcastle Section of the Institute of Chemistry: "Engineers and the Interpretation of Chemical Specifications for Iron and Steel, in Relation to Analytical Accuracy." C. H. Ridsdale. 6.30 p.m.	Technical Institute, Corporation Road, Middlesbrough.
3	Institute of Chemistry: Annual General Meeting.	30, Russell Square, London.
4	Chemical Engineering Group and the Hull Chemical and Engineering Society: "Centrifugal Dryers and Separators: Their Construction and Use." E. A. Alliott. 7.45 p.m.	Hull Photographic Society's Rooms, Grey Street, Park Street, Hull.
4	University of Birmingham Chemical Society: "Atomic Weights and Isotopes." Dr. F.W. Aston. 5.30 p.m.	Chemical Lecture Theatre, Edgbaston.
4	Institute of Metals (N.E. Coast Section): "Alloys for Use with Superheated Steam." H. J. Young.	Armstrong College, Newcastle-on-Tyne.
5	Society of Public Analysts: Ordinary Meeting.	Burlington House, Piccadilly, W.1.
6	Chemical Society: Ordinary Scientific Meeting. 8 p.m.	Burlington House, Piccadilly, W.1.
7	Chemical Engineering Group: "Adsorbents—With Special Reference to Silica Gel." Professor E. C. Williams. "Activated Carbon." Major V. F. Gloag. 4.30 p.m.	Engineers' Club, 39, Coventry Street, London, W.1.
7	Society of Chemical Industry (Manchester Section): "Some Chemical Qualities of the Living Cell." Professor F. Gowland Hopkins.	Textile Institute, 16, St. Mary's Parsonage, Manchester.
7	Institute of Metals (Sheffield Section): "Some Aspects of Alloy Plating." S. Field. 7.30 p.m.	The University, St. George's Square, Sheffield.
7	Royal Institution of Great Britain: "The Inner Structure of Alloys." Dr. Walter Rosenhain. 9 p.m.	21, Albemarle Street, London, W.1.
10	Institute of Metals (Scottish Section): Annual General Meeting. Address by G. B. Brook. 7.30 p.m.	39, Elmbank Crescent, Glasgow.
10	Royal Society of Arts (Cantor Lecture): "A Study of the Destructive Distillation of Coal" (Lecture III.) E. V. Evans. 8 p.m.	John Street, Ade'phi, London, W.C.2.
11	Northern Polytechnic Institute, (Chemical Section): "Fine Glass Manufacture". J. H. Gardiner.	Holloway, London, N.

Treatment of Water for Industrial Purposes

Conference of Mechanical and Chemical Engineers

On Tuesday a conference on the Treatment of Water for Industrial Purposes was held jointly in London between the Institution of Mechanical Engineers and the Chemical Engineering Group of the Society of Chemical Industry. Four papers were presented dealing with different aspects of the subject. Mr. B. Heastie's paper dealt comprehensively with the different methods of water purification for steam raising and other industrial purposes, laying stress on the practical aspects of the processes. This paper covered the field very fully, as distillation, softening by the addition of lime-soda mixtures, by zeolites, and by heating, removal of gases by vacuum, and of oil by various means were all covered. Mr. J. P. O'Callaghan covered a similar field and gave some illuminating examples of the economic importance of water treatment under modern conditions. An interesting part of this paper was the description of the plant installed by the Gas Light and Coke Co., at Beckton, for using Thames water. The other two papers dealt with more detailed aspects of water treatment. Messrs. T. P. Hilditch and H. J. Wheaton described the preparation and use of a new base-exchanging water softener in the form of a silicate gel, which is being developed by J. Crosfield and Sons, Ltd., and Mr. H. W. Coulson described a method of removing algae and other organic matter found in river water by the addition of a small quantity of chlorine, which has been in successful operation for some time in the condensers at a Hackney works.

Purification by Distillation

The paper by Mr. B. Heastie, B.Sc., M.I.Chem.E., dealt with "General Methods of Water Purification for Industrial Purposes," the following being an abstract:—The ideal boiler feed is distilled water, as obtained by evaporation and condensation of natural water free from air. It is carried out on a large scale in electrical power stations where one can see most clearly the deleterious effects of bad water feed, and where efficiency is a first consideration, a small variation resulting in a profit or loss. The evaporation of raw water causes the formation of calcareous scaling and deposits which must be prevented from depositing upon the tubes. High pressure evaporators usually scale up rapidly, as a hard deposit is formed on the tubes due to the high temperature. To meet this difficulty the steam is passed through coils which can be easily removed for scaling. This is effected by passing cold water through the hot coils, which contract and crack off the scale from their outer surface. In low pressure evaporators working at temperatures round 250° F., the water is passed through straight tubes, the scale is much softer and can be easily removed by means of a wire brush or scraper.

The economical production of distilled water in power stations is dependent upon the fact that the main object of the station is to produce work from heat; to this end, heat is generated at a high temperature, and converted into heat at a low temperature doing mechanical work in the conversion. Thus heat has a certain commercial value dependent upon its temperature or thermodynamic head. When heat is exchanged between two bodies, it is essential that the transference should be carried out with a minimum temperature difference.

Purification by Chemical Means

When applied to boiler feed water chemical methods of purification aim at removing from the water the calcareous salts which it contains, and which—decomposing in the boilers—cause scale to be deposited.

These salts can be divided into two categories: carbonates and non-carbonates.

1. In the first category belong almost all the salts in the most common waters; bicarbonates of calcium and magnesium are the most important. In the usual process of purification they are eliminated.

(*a*) By the addition of barytes or caustic lime; (*b*) By the addition of caustic soda; or (*c*) By the addition of carbonate of soda. In all these cases the insoluble calcium or magnesium carbonate is precipitated, and the water fed to the boilers is always alkaline.

2. In the second category belong a great number of salts, of which we may mention sulphate of lime and chloride of magnesium. Chloride of sodium cannot be eliminated by practicable chemical methods from any water. Carbonate of soda or caustic soda removes sulphate of lime and chloride of magnesium. During these changes, the reactions are not quantitative; they give rise to a state of equilibrium and move this equilibrium in the favourable direction—that is to say, in the direction giving the desired precipitate—one is obliged to introduce an excess of the precipitating reagent. The water introduced in the boiler is then, in all cases, alkaline and contains carbonate of soda. Generally, there remains in solution in the water from 30 to 60 mgs. per litre of calcium carbonate. When concentration in the boiler produced by evaporation becomes sufficient for precipitation of the carbonate in spite of the high temperature, it is deposited on the walls of the boiler and the tubes, forming incrustations, which become harder the slower the rate of deposition. To avoid this, the boiler is blown down, thus removing the mud collected.

Zeolite Softeners

Zeolite softeners consist of a filter the bed of which is usually composed of a hydrated silicate of aluminium carrying a large amount of loosely bound and chemically active sodium. When water containing calcium and magnesium salts is passed through this bed of zeolite, the sodium is exchanged for the calcium and magnesium, and the water leaving contains only small amounts of the latter substances.

After a certain time all the available sodium in the zeolite has been given up in exchange for the calcium and magnesium. The zeolite can then be regenerated by soaking the filter bed in a strong solution of common salt. The calcium and magnesium which had been absorbed by the zeolite are exchanged for the sodium of the sodium chloride, forming calcium and magnesium chlorides.

After steeping for some time, the brine is drawn off and the free salt rinsed out until the water runs sweet. The zeolite is then again in its effective state.

Purely physical purification can be realised by the action of heat, by the action of vacuum and by electrolysis. These have the advantage of not introducing soluble salts into the water and are sometimes useful.

Oil Extraction

Water that has been in contact with mechanical parts of engines or exhaust steam from engines, is polluted by a mixture of small quantities of lubricants. The oil is not only mixed with the water, but is also in the water in emulsion, so that a simple decantation only enables one to eliminate the drops which float on the surface, and does not eliminate the oil in emulsion; therefore the water remains opalescent.

The separation of oil from water can be carried out either mechanically or chemically, or by electrolysis.

Mechanical oil separation can be obtained by simple filtration through coke. This absorbs the oil and quickly becomes greasy. The dimensions of these filters are very large, and the attention to the filtering medium and its replacement is not an economic proposition.

Oil separation can be carried out chemically by adding a mixture of an iron solution and aluminium to the water, followed by the addition of soda or carbonate of soda. One obtains by this means a gelatinous and flaky precipitate which carries with it all the oil in the water, including that which is in a state of emulsion. This precipitate is easily filtered, and the water is then free from oil, but enriched by a soluble salt caused through the reaction which has served to produce the oil-separating precipitate.

The most up-to-date process for oil extracting is the electrolytic oil separator. It is based on the property possessed by an electric current passing through water of destroying oil emulsion and accumulating this in the form of frothy flakes which can be separated mechanically.

The Use of River Water

A paper on "Water Purification for Industrial Purposes," by Mr. J. P. O'Callaghan, F.C.S., dealt with (1) Sedimentation and filtration of water for works use, as applied to a turbid river; (2) softening by the lime-soda process; (3) softening by the zeolite (Permutit) process.

A combined sedimentation and filtration plant recently put into operation at the Beckton works of the Gas Light and Coke Company, capable of dealing with 4,000,000 gallons of Thames water per day, was described. The river at Beckton is tidal and is frequently excessively turbid, so that a thoroughly efficient filtration plant is essential to prepare the water for works purposes. The plant consists of four large sedimentation basins and eight rapid sand filters of the gravity type and is particularly interesting on account of the high degree of efficiency obtained by the primary basins. Arrangements are included in the plant for the preparation of the necessary lime reagent used in the purification process and adding it to the water in suitable proportions.

The intimate admixture of the lime with the water is obtained by its fall into a trough and thence along distributing channels communicating with the coagulation and sedimentation tanks. These basins are of sufficient size to hold approximately 600,000 gallons of water, thus allowing for nearly four hours' time period for reaction and sedimentation when the plant is working at its full rated capacity. The filtering medium employed is a specially sifted and suitably graded mined quartz sand, supported on a bed of double-washed and graded gravel.

Softening by the Lime-Soda Process

After reviewing the advantages of softening water for boiler purposes Mr. O'Callaghan's paper described the Lassen-Hjort system of softening by lime and soda as typifying standard modern lime-soda apparatus. The oustanding feature of the Lassen-Hjort mixing and measuring apparatus is the device for the separate and exact measurement, in small, absolutely definite and predetermined quantities, which can be varied at will, of both hard water and softening reagents. The *lime-milk* used in this apparatus has a strength of 10 per cent.; the *lime-water* used in earlier types of softeners had only an average strength of 0·13 per cent.; the lime-milk, therefore, has a strength of nearly 100 times that of the lime-water, and produces a far quicker and more complete reaction. A further advantage of using lime-milk is that a known quantity of fresh lime can be mixed with a known quantity of water, a solution being obtained the strength of which is definite.

A striking instance of the satisfactory solution of the problem of water treatment for use in locomotive boilers is afforded by the results obtained by the Great Western Railway Company with a Lassen-Hjort plant, which has now been in use for ten years at their Swindon locomotive works. The water dealt with in this plant is derived from four different sources, the supplies from which are, however, mixed in constant proportion, giving a water the hardness of which, in the untreated state, averages 17° to 18° Clark. A laboratory experiment with this water showed that it was possible by careful adjustment of the lime and soda to reduce the hardness to 1½° Clark. Tests from the bulk water treatment taken by the Great Western Company show that the average hardness of the water after treatment is 2° Clark, while the residual alkalinity (*i.e.*, excess of lime and soda remaining in the water after the conclusion of the softening process) averages only 1·5 grains per gallon, or 1½ parts in 70,000 parts by weight.

Softening by the Permutit Zeolite Process

After describing the now well-known Permutit zeolite process, a description was given of another type of Permutit which has recently been introduced for industrial use. This new material, named "Permutit B," differs from ordinary Permutit both in physical characteristics and molecular constitution, these differences causing a radical change in the timing of the periodic cycle of softening and regeneration, enabling day and night continuous duty to be performed by one unit only instead of two. In the case of Permutit B the plant is designed to operate for periods varying from three to six hours at a time, and is then completely exhausted. The material, however, is capable of extremely rapid regeneration, and a large industrial unit can be completely regenerated and recommissioned in an hour.

The concluding sections of the paper dealt with the advantages to the textile and dyeing industries obtainable from uniformly softened water for washing in obviating irregularities caused by the deposit of lime or magnesium salts on the fabric.

Removal of Organic Matter

Mr. H. W. Coulson, M.B.E., A.M.Inst.C.E., dealt with "The Treatment of Water for Condensing Purposes," the following being an abstract of the paper:

The necessity for large quantities of water for cooling purposes frequently fixes the site of the power plant on the side of a river or canal. Nearly all such waters contain vegetable matter and micro-organisms, notably algæ, and the passage of the water through the plant raises it to a temperature which assists the rapid development of the organisms. This results in the formation of a gelatinous deposit upon the inner surfaces of the condenser tubes, and the deposit acts as an insulator to the passage of heat from the condensing steam. It has recently been found that an exceedingly minute dose of chlorine added to the circulating water completely inhibits the formation of the jelly-like deposit, which would otherwise act as an effective barrier to heat transference, leading to progressive loss of vacuum, and entailing frequent cleaning. The quantity of chlorine required is extremely small—in most cases one-third of a part per million is sufficient to maintain the condenser tubes in a clean condition. An objection is sometimes raised that corrosion of metal fittings might occur in the presence of chlorine. The experience gained at a number of power plants, some using as much as two million gallons of water per hour, where this treatment has been in use for the past two years shows that no corrosion whatever takes place. It would appear that the chlorine is immediately absorbed by the organic matter present in the water, as no free chlorine can be detected in samples collected from the condenser discharge.

The paper concluded with a description of the apparatus which occupies a very small space, and requires no attention other than a slight adjustment of the regulating valve to increase or reduce the flow of gas when more or less water is circulated, and the replacement of cylinders as the contents are exhausted.

New Softening Agent

Mr. T. P. Hilditch and Mr. H. J. Wheaton described a comparatively new base-exchange material manufactured by J. Crosfield and Sons, Ltd., of Warrington, under the name of Doucil.

The oldest base-exchanging compounds on the market, the natural zeolites, consist of rounded granules of no great degree of porosity, and it is evident that all the softening action takes place very close to the external bounding surface of the grain. Chemical analysis shows that but a small proportion of the soda-content of a natural zeolite is available in water-softening.

Messrs. Crosfields have been compelled to pay careful attention to the phenomena of surface action for a considerable period in quite other directions, and consideration of the experience thus gained indicated that if suitable porosity and surface could be secured it should be feasible to produce a base-exchanging compound in which much more of the combined soda could be utilised to produce soft water than in the cases of previous materials, natural or artificial. This expectation was realised when it was discovered how to produce a complex silicate containing replaceable combined soda in the form of a dried gel.

The final dried and washed product conforms closely to the anhydrous composition Na_2O, Al_2O_3, $(SiO_2)_5$, which demands 13·3 per cent. Na_2O, 22·0 per cent. Al_2O_3 and 64·7 per cent. SiO_2. Of the soda present, rather more than 3 per cent. is converted into non-exchangeable calcium silicate, and the remaining 10 per cent. can be completely replaced alternately by lime and by soda.

For practical purposes, however, and especially if completely softened water is required, about 40 per cent. of the exchangeable soda, or 4 per cent. of the weight of anhydrous Doucil present, is exchangeable for lime before the Doucil allows appreciable quantities of calcium or magnesium salts to escape.

At first the manufacturers were unduly afraid of the resistance to water flow, and recommended the use of relatively large grains, at least in the lower part of the Doucil bed. It was soon found, however, that softening capacity was being wasted in this way, and that the material was sufficiently hard not to pack down too tightly under water pressure when used in a smaller grade.

The preferred size is now from 1/8 to 1/20 in., whilst a still

smaller size, 1/20 to 1/30 in., is sufficiently granular to be very useful as a top layer in a Doucil filter. A bed 6 ft. deep of the former size offers a resistance to waterflow of only about 1 lb. per sq. in. at normal rates of flow, whilst a 3 ft. bed of the smaller grade has a resistance of about 4 lb. per sq. in. under similar conditions.

The salt consumption is much reduced by using the last portion of the brine from one regeneration as the first half of the brine for the next regeneration. The simplest way to operate a Doucil plant is to pass the hard water downwards; regeneration should take place in the direction of upward flow. It is important to preserve the surface of the Doucil grains in an absolutely clean condition, and therefore only water free from suspended matter should be admitted to the doucil bed.

The Stream Line Filter

Following the reading of the papers, Dr. H. S. Hele-Shaw explained recent developments in connection with the Hele-Shaw Stream Line filter (see THE CHEMICAL AGE, September 29, 1923, p. 342). The first new development was a method of increasing the number of filters in the pack. Longer piles of sheets of paper could be made by interposing metal plates at intervals, the plates being used to prevent any crinkling of the paper filtering sheets which would otherwise take place in deep piles. The second development was the employment of a valve for reversing the direction of flow, for clearing out any foreign matter retained by the filter. The next point was the use of a new method of regulating the pressure upon the paper sheets by employing between the nuts of the connecting bolts spring washers, the compression of which could be measured by means of a taper gauge. Another important development was the provision of an opening in the head of the filter to enable the holes in the filter to be cleared out by passing a rod through them.

Points Raised in Discussion

Mr. F. H. Adams, of the L.M. and S. Railway, opened the discussion by referring to the difficulties met with in the case of some water used by the company for locomotive boilers. This had a marked corrosive action, there being apparently no reason revealed in its composition. Softening had reduced the boiler scale, but the corrosion remained.

Among other speakers, Miss Snowden asked as to the methods by which hardness was determined, and Mr. R. Stewart (Royle Laporte Process) pointed out that for some purposes barium carbonate was a satisfactory softening agent, as calcium and magnesium sulphates were precipitated as a double salt with the barium.

Mr. Heastie, replying to Mr. Adams's remarks as to corrosion in boilers, said that the Kestner Co. had, some time ago, put on the market an apparatus in which manganese steel shavings were used, and the water was passed through these. In an average water the oxygen content was, perhaps, 5 or 6 c.c. per litre at normal temperatures, and the apparatus reduced this to less than 0·1 c.c. per litre. In cases where boilers had corroded this had effected a complete cure, as in most cases corrosion had been traced to oxygen in the water.

Dr. Newton, replying to Miss Snowden, said that the actual determination of hardness was made by calculation from the lime and magnesia found by analysis. Of course, the hardness determination made by soap would give the total hardness. Titration with acid would give the temporary hardness.

A hearty vote of thanks was accorded the authors at the conclusion of the discussion.

Sir Max Muspratt and American Chemists

I UNDERSTAND (the London correspondent of the Liverpool *Daily Post* states) that the American Chemical Society were very anxious to secure Sir Max Muspratt as one of the British representatives at their annual meeting in Washington in April. Owing, however, to the British Empire Exhibition, in which Sir Max is particularly interested as president of the Association of British Chemical Manufacturers (which is responsible for the chemistry section), and other engagements, this was found to be impossible. Later in the year Sir Max Muspratt will be attending the British Association meetings in Canada, and the American Chemical Society are making efforts to secure his attendance and addresses at meetings of the society about that time. It is certain that he would be very cordially welcomed.

Success of a British Invention

To the Editor of THE CHEMICAL AGE.

SIR,—We beg to inform you that we have just received advice from the Department of the Interior, Washington, that our "Proto" self-contained breathing apparatus, for rescue and recovery work in mines, has passed the Bureau of Mines approval tests, which are of a very exacting character, and that it is now an approved rescue apparatus for use throughout the United States. The "Proto" is thus the first mines rescue apparatus to pass the British Government Mines Department tests, and the only British apparatus to pass both the British Government and American Government tests.—We are, etc.

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February 27, 1924.

Retirement of Professor J. B. Cohen

Twenty Years Professor of Chemistry at Leeds

PROFESSOR J. B. COHEN, who is retiring from the professorship of organic chemistry at Leeds at the end of the session, is known to a wide circle of chemists through his organic text-books. He has been professor at Leeds for twenty years, and for fourteen years before that at the Yorkshire College, the immediate predecessor of Leeds University. Professor Cohen was born at Manchester on May 6, 1859, and was educated at the Owens College and at Munich, where he took the degree of Ph.D. From Germany he returned to Owens College, for some years as student and as demonstrator, and he had some years' experience in a Lancashire chemical works.

During the war Professor Cohen did very valuable work on novocaine and other anæsthetics, organising a department at the University for their production, and after overcoming all the initial difficulties he turned out something like a pound a day, the whole of the staff, who were members of the University, working without remuneration. With the introduction of chemical warfare Dr. Cohen became a member of the committee investigating protective measures. Among other interests, Dr. Cohen has devoted much time to the investigation of the smoke nuisance in Leeds, and has published a book entitled *Smoke: A Study of Town Air.*

Professor Cohen's Successor

Dr. Christopher K. Ingold, of the Imperial College of Science and Technology, has been appointed his successor. Dr. Ingold was educated at Sandown, Isle of Wight; University College, Southampton; and the Imperial College of Science and Technology, London. During the war Dr. Ingold conducted research work for the Chemical Warfare Committee, and assisted in the design and erection of extensive plant for the manufacture of substances required by the Committee. In 1918 Dr. Ingold joined the research staff of the Cassel Cyanide Company, Glasgow, and soon after was placed in charge of the general research work of the firm. In 1920 he joined the staff of the Imperial College of Science and Technology, where he at present holds the position of Lecturer. During the last four years Dr. Ingold has supervised the Organic Chemistry Research Laboratories of the Imperial College, and has had a large share in the direction of a semi-large-scale organic chemistry laboratory. Dr. Ingold has made noteworthy contributions in chemical research, and during the last nine years has read over 40 original papers—most of them on organic chemistry subjects—before the Chemical Society.

Infringement of British Oxygen Patents

ON Thursday in the Chancery Division Mr. Justice Tomlin delivered his judgment in the action by the British Oxygen, Ltd., Upper Edmonton, against Maine Lighting Co., of A Side, Newcastle-on-Tyne, for an injunction to restrain infringement of a patent for an invention relating to an acetylene oxygen metal-cutting blow-pipe (see THE CHEMICAL AGE, February 23, p. 198).

His lordship said at the material date a number of recognised devices for controlling oxygen in a blow-pipe were in existence, but the plaintiffs contended that although each of their devices was old there was sufficient invention in the way they grouped them in combination to support their claim. His lordship was of opinion on the evidence given by the plaintiffs themselves that this was not so and he dismissed the action with costs.

Nitrogen Recovery from Coal

Society of Chemical Industry: Birmingham Section

MR. W. A. CALDER (Chance and Hunt, Ltd., Oldbury) presided at a meeting of the Birmingham and Midland Section of the Society of Chemical Industry, held at the University of Birmingham on Thursday night, February 21, and Dr. A. C. Monkhouse (Fuel Research Department, University of Leeds, and Institution of Gas Engineers) read a paper on "The Nitrogen of Coal and Ammonia Recovery." There was a growing demand, he pointed out, for nitrogenous manures, particularly for agriculture, and it was important that we should recognise the relative position of the by-product ammonia to the whole nitrogen industry. The knowledge of the shortage of the natural deposits had given an impetus to the manufacture of nitrogen products. The total world production and consumption of ammonia compounds in 1913 was about 1,322,000 tons, whereas the present output was 2,040,000 tons per annum, of which it was estimated 1,770,000 tons were in the form of ammonium sulphate. The time was fast approaching when the output would rival that of nitrate of soda. One of the sources of ammonium sulphate—in this country practically the main source—was the by-product ammonia industry, consisting of the gas and coke oven industries.

The amount of nitrogen in bituminous coals was on the average 1·4 per cent. The respective merits of the Dumas and Kjeldahl methods of determination were discussed, the Dumas yielding a higher value of 0·1 to 0·2 per cent. for bituminous coals due in the main to the Kjeldahl method taking no account of occluded nitrogen. An account of the present knowledge of the origin and nature of the nitrogen in coal was given. Adventitious sources, such as animal albuminoid matter and adsorbed nitrogen, were mentioned, but the main source of the nitrogen of coal lay in the original protein bodies of the plant substance. On distilling coal 11-18 per cent. of the nitrogen was obtained as ammonia, 50-80 per cent. was left in the coke, the remainder was found in the tar and as free nitrogen cyanogen. The amount of nitrogen remaining in the coke was emphasised, and the influence of carbonising coal in different atmospheres on the nitrogen of the coal was described in detail, with special reference to the author's work with Professor Cobb presented to the Institution of Gas Engineers. An inert atmosphere of nitrogen, an atmosphere of hydrogen, and an atmosphere of steam were compared. The nitrogen compounds in coal were converted on carbonisation into compounds which might roughly be classed under three heads :

1. Those which yielded ammonia direct on heating ;

2. Those which yielded ammonia on combination with hydrogen ;

3. The so-called carbon "nitrides" which were split up by steam with the formation of ammonia. Hydrogen was beneficial in increasing the yield of ammonia during carbonisation by its specific action. The idea of obtaining ammonia by passing hydrogen over metallurgical coke was shown to be impossible, due to the nitrogen being present in a form only decomposable by steam. During carbonisation the maximum hydrogen evolution occurred at the time of maximum ammonia evolution thus increasing the yield of ammonia by its specific action.

The passage of water gas through a retort did not increase the concentration of hydrogen owing to the similarity in hydrogen content of the coal gas and the water gas, but merely preserved the ammonia formed by diminution of its time of contact with the red hot coke. This was confirmed by recent work by Mr. Braidwood at Coatbridge. The work of Salmany, Pexton and Cobb had shown that with high temperature (1,100° C.) coke and metallurgical coke the carbon-nitrogen ratio remained constant during gasification by steam. The increased yields of ammonia of vertical retorts with steaming and the high yields of Mond producers were also mentioned.

Points Raised in Discussion

The Chairman, in opening the discussion, inquired if experiments had been made by heating coke in a vacuum ?

Mr. Ivon Graham (Coal Research Department, University of Birmingham) thought there was danger of error when one dealt with low temperature cokes ; the amount of gas adsorbed would be much greater than by coal. It appeared that steam had an oxidising action ; experiments were being carried out at the Research Laboratory at Birmingham on a high pressure basis, and these seemed to show an increased production of nitrogen.

Dr. A. Parker (Fuel Research Department, Leeds University) said it was no easy matter to get an accurate nitrogen balance, but on the question of steaming in vertical retorts there was no doubt that steaming did increase the nitrogen recovered as ammonia. He thought this was largely due to the fact that the steam attacked the coal or coke, removed the carbon and rendered the nitrogen compounds more easy of attack.

Mr. E. C. Rossiter said he thought it was remarkable that in the course of seven years the production of synthetic nitrogen compounds increased from 10 per cent. of the world's output to a little over 41 per cent. The war was largely, though not entirely, responsible for that advance ; but it was apparent that any country which went to war and had not a nitrogen industry or was not able to keep command of the seas would soon be in a parlous state.

Determination of Ammonia in Solution

Messrs. N. W. Price and C. S. L. Hawkins (of the laboratories of Chance and Hunt, Ltd., Oldbury) contributed a paper on "A New Determination of the Specific Gravity of Solutions of Ammonia." They pointed out that the table published by Lunge in 1889, showing the relationship existing between the specific gravity and ammonia content of pure liquor ammonia, had up to the present been accepted as the standard one, superseding those of Carius, Grüneberg and Wachsmuth, but after a great number of determinations had been made of the ammonia content of pure liquor ammonia of a specific gravity approximately 0·880 it was realised that the data given by Lunge were not strictly accurate. Invariably the analyses showed a lower percentage of ammonia than would be expected from the published tables. The variation from Lunge's figures was so persistent that it was felt that a more reliable method for testing these high strength solutions was necessary. After many preliminary experiments a satisfactory method was devised, and was found to be so successful that it was eventually decided to check the whole of Lunge's figures.

Owing to the difficulty of estimating loss by evaporation, the conclusion the authors arrived at was that the only satisfactory way of making new determinations was to weigh the ammonia solutions in a sealed vessel and then to estimate the whole of the ammonia contained in that vessel. The apparatus finally evolved and used throughout the whole series of tests consisted of a constant temperature bath in which was placed the ammonia container—a glass vessel holding about 2 litres liquor ammonia ; to this was attached the weighing pipette, and to the other end of the pipette a temperature-check device, finally delivering into a flask. Attached also to the ammonia container was a safety trap for the ammonia. The ammonia used was a chemically pure solution of ammonia gas in distilled water, freshly made solutions being used to minimise any action on the glass of the containing vessel. The total amount of residue on evaporation did not exceed 5 parts per million.

It was found advantageous, in the case of solutions stronger than ·880 specific gravity, to have the temperature check vessel about 2 in. above the level of the liquor in the large ammonia vessel. For the standardisation, pure sodium carbonate was used, and the standardisation was also checked against pure dry ammonium chloride. Five grames of the ammonium chloride were weighed out and distilled with caustic soda through an apparatus containing a bulb trap into an excess of the standard acid. The distillate was cooled and the excess of acid titrated against normal soda first with methyl orange as indicator, the final end-point being determined with methyl red. After the sulphuric acid had been standardised the caustic soda was standardarised against the sulphuric acid.

A comparison of the tables brought out the following points :

For specific gravities between 0·880 and 0·885 the new figures obtained were lower than Lunge's, the maximum difference being 0·33 per cent.

For specific gravities between 0·885 and 0·996 the new figures were higher than Lunge's although the difference was very small.

Destructive Distillation of Coal

Cantor Lecture by Mr. E. V. Evans

THE first of a series of three Cantor Lectures on "The Destructive Distillation of Coal," before the Royal Society of Arts, was delivered on Monday, by Mr. E. V. Evans, F.I.C. (Chief Chemist and Products Manager of the South Metropolitan Gas Co.).

Professor H. E. Armstrong, F.R.S., who presided, said he looked forward to the time when our coal would be treated scientifically and systematically, and presented to us in a form in which we could use it economically; when a large part of the roof of the mine was no longer carted to London and sold to us as coal, which had been previously wetted, perhaps. Though he had been interested in the subject since 1885, he had never had much hope that we should agree to look at it and study it from a rational point of view, but his hopes were going to be raised, because at last we had a man (Mr. Evans) who had made up his mind that there was something in coal worth taking notice of.

Mr. Evans, in his lecture, dealt with the general question of coal conservation from the viewpoint of a chemist in the gas industry. He considered the destructive distillation of coal as a true chemical process, the raw material entering being therms, whilst the process itself consisted in the distribution of the original thermal energy of the coal into more useful and economic forms. Discussing the introduction of the method of the computation of results on the basis of therms per ton of coal carbonised, he said that it was not only the consumer of gas who benefited from the therm system, but in the gas industry itself the new intrepretation of results was leading to increased efficiency. The adoption of this system was likely to constitute a very great step in the appreciation of the coal conservation problem. The gas manufacturer to-day sees more clearly that the ship, barge or wagon bringing coal to his works is delivering a load of therms, a certain proportion of which might be distilled by heat, and that it was his duty to distribute those therms carefully into the gas, tar and coke, or coke tar and gas, so that the process might be carried out with the maximum conservation of therms. We were bound also, said the lecturer, to devote the utmost attention to all subsidiary products, and when it was generally realised that these subsidiary products were sources of potential therms, they would be placed in a position only second to that of gas.

High and Low Temperature Carbonisation

In the study of the distribution effect by high and low temperature carbonisation, he said that in the case of high temperature distillation (without the admission of steam), one ton of coal containing 300 therms would yield about 72 therms of gas of 560 B.Th.U. per c. ft., and some 17 therms of tar, leaving coke containing about 199 therms. The process losses would be of the order of about 12 therms. The process loss in the case of low temperature carbonisation was about 16 therms. In this case the ton of coal yielded some 35 therms of gas of 1,090 B.Th.U. per c. ft., together with 26 therms as low temperature tar, and 223 therms of coke, itself containing 9·3 per cent. of volatile matter. The loss of therms from the original coal substance was due in both cases to the fact that the heat required for distillation was not taken wholly through the walls of the retort, but was partly supplied from the coal substance itself undergoing carbonisation.

Determinations made upon low temperature fuel containing about 10 per cent. volatile matter had shown that the 9·3 per cent. remaining in the coke would represent about 29 therms of the potential volatile matter of the original coal. If this potential volatile matter be added to the amount actually obtained, there was practically no difference in the yield of so-called volatile therms and coke therms in the two methods of carbonisation. Such slight difference as did exist, however, was to the advantage of high temperature carbonisation, but this might be fortuitous. Comparing the two methods, Mr. Evans said that, from his results, it would appear that the low temperature process was not superior from the point of view of efficiency. It was simply a different distribution of the thermal energy of the original coal—the high temperature process arrested. This was important, in view of the fact that the pure chemist was naturally inclined to believe that high temperature carbonisation, with its known drastic decomposition of the coal substance, was a wasteful process, and that the low temperature treatment was more conducive to the conservation of the energy of the coal substance. Provided the high temperature process was conducted so as to obtain yields similar to those indicated, however, there would appear to be no ground for supposing the low temperature process to be definitely superior from the point of view of conservation of energy.

Coming back to the 29 therms of potential volatile matter retained in the low temperature coke, he said these were subsequently burnt in the household fire as a low calorific value gas. There were no complex hydrocarbons to be distilled away or partially burnt, with the production of soot or smoky flames; the material, in fact, was a coal-gas-coke mixture.

As to the prevention of wastage of gaseous therms, the secret of this, and of conserving the energy of the original coal, lay in the possession of a suitable design of retort, bench fittings and accessory plant, and secondly, in their maintenance in the highest possible state of efficiency and repair.

Thermal and Analysis Models

Mr. Evans then exhibited thermal models, the production of which was a convenient method of examining the amount of useful work effected during each hour of the carbonisation period. The models were constructed by combining the hourly volume curve and the calorific value curve. The length of the models represented the time of carbonisation in hours, the height represented the volume of gas produced, and the breadth represented the calorific value. The value of this means of representation was that the mass of the model itself was proportional to the thermal yield of gas, and also that a section taken at any one period showed in its area the amount of work being done at that instant.

One of the outstanding observations to be made was the large volume of gas of very high calorific value evolved in the first ten minutes after closing the door of the retort. In this period 5·04 per cent. of the total gaseous therms was produced, and, knowing that the constituents of such a gas were likely to be unstable and quite unsuitable to withstand contact with the heated sides of the retorts, an attempt was made to apply a higher vacuum during this early stage of the carbonising period, for the purpose of preventing decomposition which proved successful in materially reducing the calorific value and expanding the volume of the gas made during the early stages.

Mr. Evans also exhibited analysis models composed of sections representing the different constituents of the gas. The height of each section represented the calorific value of the constituent, and the breadth represented the volume produced at any one moment during the period of carbonisation.

The Effect of Unsound Retorts

Discussing soundness of the retort and its effect on the nature of the gas made and the yield of gaseous therms, the results obtained from working under standard conditions, there was one conclusion to be arrived at, namely, that in the interests of high gaseous thermal yields, all retorts should be maintained in a high state of repair.

As to the effect of allowing a small current of air, as distinct from waste gases, to enter into what would practically be the centre of a 20 ft. retort, the lecturer said that the air so introduced did considerable damage eventually. The best means of obtaining the highest thermal yields from a setting in a bad state of repair would be to operate each retort according to its condition. This would necessitate varying the vacuum maintained during carbonisation to a different degree in each retort, and the possession of a device to effect this would carry with it many other advantages.

As a chemist, Mr. Evans was not displeased to find chemists well established in the retort house; in a well-designed and conducted house they could save large sums of money. But there was a limit to all good things, and chemists were incapable of serving any useful purpose in a retort house which managed itself by virtue of its uncontrollable conditions. The carbonisation of coal became a science only when the reactions taking place, and their efficiencies, were carefully controlled by the chemist, and this was possible only when the engineer installed a first rate retort house and maintained it in a first class condition.

Use of Pyrometers in Glass Works

Discussion at The Society of Glass Technology

At the meeting of the Society of Glass Technology in Sheffield, on Wednesday, February 20, two sessions were held. In the morning there was an exhibition and demonstration of modern pyrometers at the Department of Glass Technology of the University. The following firms exhibited: The Bowen Instrument Co., Ltd., The Cambridge and Paul Instrument Co., Ltd., The Foster Instrument Co., The Optical Pyrometer Syndicate. Booth and Miller also demonstrated their new temperature controller.

At the afternoon session the subject under discussion was "The Use of Pyrometers in Glass Works." Five papers were presented.

Pyrometers in Glass Works

Mr. E. A. Coad-Pryor, B.A., in the opening paper, said that the value of pyrometric equipment in a glass factory depended essentially on three factors: (1) The reliability of the pyrometer itself, particularly the clockwork; (2) the skill which was expended on its maintenance; and (3) the attitude with which the management, foreman and furnace operators regard the pyrometer. Of these three the last was regarded as the most important. The pyrometer in no way displaced the trained eye; its real function was to supply further information in order that a highly skilled operator might be able to get more out of his plant than had hitherto been possible. The range of temperatures to be measured could conveniently be subdivided into three groups: (1) The range 0° to 700° C., covering lehrs, stack temperature, produce gas, etc.; (2) from 700° to 1,200° C., regenerator temperature pot work; and (3) above 1,200° C., the temperature of the melting furnaces.

In the first group the thermo-couple was the most convenient instrument to use. Some sort of a portable thermo-couple should be part of every works equipment. A convenient couple for low temperature work was iron-constantan, the wire to be about 22 gauge.

In the high temperature ranges an optical or total radiation pyrometer was, as a rule, the most convenient. The tank furnace might be subdivided into three zones; the melting zone, the plaining zone, and the refining end. Two permanent pyrometers should be used on each furnace, one on the refining end the other sighting through a hole in the end wall at the melting end of the furnace. The use of couples embedded in the wall of the tank or in the crown caused probably more trouble than they were worth.

The optical or radiation pyrometer if used with discretion was the most reliable and the most easily applied. The author's experience was that the optical instruments gave less variable readings than did the radiation instruments. The all important factor with any installation was the training of the staff and operators to use the instruments with intelligence as an aid to the maximum efficiency in furnace manipulation. A bibliography was added to the paper.

Continuous High Temperature Measurements

In the strictest sense of the term, Mr. W. M. Clark, Ph.B. (U.S.A.), stated in his paper there was probably no absolutely accurate method existing for constantly determining glass-house temperatures. We could only approach this desirable aim by refinements of installation and careful maintenance, and this meant both equipment and maintenance expense. Therefore, in considering the subject of a pyrometer installation the glass manufacturer must balance the factors of what his demands for accuracy will be worth against the initial and operating costs of various systems. It is always advisable to install both the indicating and recording type of instrument side by side.

Experience at a number of modern well laid out plants showed that pyrometric measurements were reflected in the costs sheets. The morale of the furnace men was improved by eliminating the human errors of judgment, in guessing at temperatures, and cost per unit of output decreased. With improvements in pyrometric equipment the tendency was for their more extensive use around glass works. The depreciation on such equipment was not excessive, about 10 per cent. per annum being a fair amount, judging from successful installations, and as improvements came along they could be incorporated into the system, replacing features which became obsolete and thus keeping the installation up to date. A well planned system would reduce overall costs in a year more than sufficient to pay for the investment, and often would leave several times this amount if used intelligently.

The most forceful argument for the adoption of pyrometer control in a glass works was on the score of economic savings, but the information thereby made available to the management and staff was also important in showing each man a tangible effect of his operation on the thermal conditions. The producer man saw that good gas was necessary to maintain temperature, the furnace man saw the result of proper draught regulation, the foreman of the finishing department could be satisfied whether the ware was being properly annealed, and the whole schedule of production was benefited.

Recent Advances in Design

In his paper on "Recent Advances in the Design of Temperature Measuring Instruments, etc.," Mr. R. W. Whipple, F.Inst.P., stated that one difficulty in connection with disappearing filament pyrometers was to get two lamps which would be interchangeable. Methods for overcoming this difficulty were indicated. The speaker then said how greatly he had been impressed with what he had seen recently in the United States in the matter of automatic temperature control. He understood considerable work was being done in this connection in glass works, and referred to the works of Messrs. Keuffel and Esser when lehr temperatures were controlled from 200° C. to 600° C. For every kind of glass-ware a special cooling curve was followed. In the United Kingdom automatic temperature control was being developed. The main principle in such control was a galvanometer needle which was deflected by some method. Lantern slides were then exhibited showing various forms of controller, including (1) Brown, (2) Bristol, (3) C. Engelhard, (4) Leeds and Northrup, (5) Cambridge, (6) Barr, (7) Althorpe. It should be possible to control lehr temperatures by some such automatic control apparatus, and so to lessen the worries of the works manager.

Practical Applications of Pyrometers

Mr. C. E. Foster, F.Inst.P., discussing practical applications, said that both optical and total radiation instruments were calibrated for what were known as "black body" condition, and when used on hot bodies which were not technically what were known as "black bodies" the reading would be in error by an amount which varied with the actual condition. An ordinary large glass melting tank was by no means a "black body." The author suggested that luminous gas flames might have the power of selective emission, that is, they radiated a light which was not in proportion to their temperature, but might be of an intensity which would correspond to the brightness of a solid hot body at a much higher temperature. Considering a surface of molten glass viewed obliquely in a furnace that did not realise "black body" conditions, it obviously had a considerable reflecting power, but he found that its reflecting power as experienced in measuring with a total radiation pyrometer was relatively much less than the unoxidised surface of molten metal. Further consideration showed that this was reasonable, because there was some considerable transparency in the glass so that it would actually emit a greater proportion of the heat from inside. Thus it was actually found that molten glass approached more nearly to a true "black body" than unoxidised molten metal.

Reflections on Pyrometer Design

In a paper on Pyrometer Design Mr. W. Bowen stated that economy in fuel consumption, long life of furnaces or other heating devices employed, elimination of waste of raw materials and of irreparable losses of finished products, all depended upon the raising of the heat-treated materials to no less, and no more, than the requisite temperatures. The value of pyrometers to such heat-treatment problems was now too well recognised to need discussion. A few of the standards which a good pyrometer should fulfil were as follows:—(a) Simplicity of design and operation, (b) robustness and freedom from liability to breakdown under shock or accident, (c) flexibility of apparatus to meet practical conditions, (d) long and stable life of pyrometer, (e) speedy response to temperature changed, (f) automatic action, (g) accuracy. These standards were then discussed with reference to the new "Pyro" radiation pyrometer, an instrument compact in shape, extremely portable, and simple in operation.

Decay of Textile Materials

"Weathering" of Wool and Cotton by Bacteria

AT a meeting of the Nottingham Section of the Society of Chemical Industry on February 20 two papers were read by Mr. S. R. Trotman, M.A., F.I.C., and Mr. R. W. Sutton, B.Sc., A.I.C.

The first paper was entitled "A Note on the Estimation of Poisonous Metals in Gelatin for the U.S.A. Food Laws." Details of various processes investigated by the authors were described, most important of which were the colorimetric determinations of lead and copper, and the precautions necessary to obviate difficulties caused by working with such minute amounts of impurities.

The second paper was entitled "The Weathering of Cotton and Wool with Special Reference to the Action of Bacteria." One of the most important properties of a textile fibre was its permanence under ordinary atmospheric conditions; there was no really permanent known fibre, although cellulose acetate perhaps most nearly approaches the ideal. Apart from ordinary wear there was a factor known as "weathering," which resulted in the gradual disintegration of textile materials. There were a number of causes which lessened the power of resistance of a fabric to weathering and a number of these had received much investigation. Defective physical and chemical processes were responsible for diminished resistance to weathering, such as rough handling of raw silk, which ruptured the fibres, or excessive "boarding" of wool. Faulty scouring, bleaching or chlorination of wool also increased its rate of decay, while cotton was rendered less resistant if the cuticular cellulose had been destroyed. The combined action of actinic light and oxygen also seemed to produce deterioration of textile fabrics. It would seem probable that traces of ozone were formed—especially in the presence of water—and Trotman and Langsdale (*J.S.C.I.*, 1923, 12 T.) had shown that ozonised air caused rapid deterioration of woollen fabrics. The action of bacteria as a cause of weathering had received much less attention than the above-mentioned causes, but it seemed that two common micro-organisms *b. subtilis* and *b. mesentericus*, have a very rapid action on both wool and cotton.

Results of Bacterial Action

In describing the experiments with these bacilli, slides were shown illustrating how the progressive changes were followed by microscopical examination. Thus a sterile piece of woollen fabric was inoculated with *b. subtilis*, and in 48 hours a distinctly damaged fibre was observed. A decreased shrinking power and an increased affinity for acid dyestuffs was the result of further action, and in five days complete disintegration of the fibres occurred. The incubating liquid was found to contain free sulphuretted hydrogen, giving a precipitate with tannic acid, and a turbidity with both acid magenta and methylene blue. *B. mesentericus* gave similar results, but was less energetic in its action.

With cotton, the first effect of the action of *b. subtilis* was to cause the fibre to swell up and lose its natural twist. In some places the cuticle was ruptured by globular swellings, while in 48 hours complete destruction of the cuticle occurred. Increase in tensile strength was observed for the first three days, followed by a steady decrease for the rest of the period of incubation (six days), when the tensile strength was below that of the original cotton. There seemed to be little difference in the nitrogen content before and after the experiments, and this indicated that the action of *b. subtilis* for removing protein from cotton was of little use. *B. mesentericus* again showed a similar, but less marked action.

Coal Substitutes

MR. R. WINNINGTON, lecturer in Fuel Technology to Sheffield University, recently said that in the near future great developments may be expected in this country in the use of pulverised coal. The use of coal dust in the form of briquettes, made from coal dust mixed with pitch or arrowroot meal, was coming into more popular favour and should help to solve the smoke problem. The alternative method of using arrowroot meal as a binder had resulted in the establishment of three factories in Rangoon.

Chemical Matters in Parliament

Cement Prices

MR. T. THOMSON (House of Commons, February 20) asked the Minister of Health if he was aware that the recent reduction in cement prices was due to the importation of foreign cement, and would he therefore allow local authorities to continue to buy foreign cement in order to prevent the British cement ring again putting up their prices.

Mr. Wheatley replied that question was under the consideration of the Government.

German Reparation (Recovery) Act

Mr. Graham (House of Commons, February 25) replying to questions by Mr. Linfield and Mr. Harmsworth on the Reparation Recovery Act, said that the negotiations which had taken place with representatives of the German Government had resulted in a reduction of the rate of the levy from 26 per cent. to 5 per cent. in respect of goods imported on or after the 26th instant. In order to guarantee that no part of the levy should be charged to British importers, the German Government had agreed to arrange for the compensation of the German exporters at a later date and to make it a punishable offence to charge any part of the levy to the British importer. Customs receipts in respect of all goods imported prior to the 26th instant (*i.e.*, those at the rate of 26 per cent.) would be reimbursed by the German Government in Gold Bonds.

Prices of Fertilisers

Mr. Buxton, Minister of Agriculture (House of Commons, February 25) answering a question by Captain Terrell, said that the prices of most fertilisers were lower this year than last.

British Dyestuffs Corporation

Mr. Webb, President of the Board of Trade (House of Commons, February 26) was questioned by Mr. Black, regarding the Government's financial interest in the British Dyestuffs Corporation. In reply, Mr. Webb said: The share capital held by the Government in the British Dyestuffs Corporation is 850,000 preference and 850,000 preferred ordinary shares of £1 each. In addition, a grant of £100,000 for research was made to British Dyes, Ltd., which was subsequently acquired by the British Dyestuffs Corporation. The present Stock Exchange quotations for the preference and preferred ordinary shares of the corporation were 11s. 6d. and 6s. 6d. respectively.

White Lead in Paint.

Mr. Shaw, Minister of Labour (House of Commons, February 27), asked by Lord H. Cavendish-Bentinck whether the Government proposed to ratify the Convention adopted at Geneva, 1921, concerning the prohibition of the use of white lead in interior painting, said:—I have consulted the Home Secretary, who hopes to introduce as soon as possible a Bill designed to give effect to the provisions of this draft Convention. Should this Bill pass into law without amendments contrary to the provisions of the draft Convention, it is proposed to ratify the Convention.

French Potash Production in 1923

THE output of Alsatian potash during the years 1921-23 was as follows:—

	1921. Metric tons.	1922. Metric tons.	1923. Metric tons.
Sylvinite 12 to 16 per cent.....	332,421	320,975	409,565
Sylvinite 20 to 22 per cent.....	205,855	337,318	348,044
Chloride 30 to 40 per cent.....	18,268	59,608	110,153
Chloride 50 to 60 per cent.....	90,252	126,866	158,278
Total	646,796	844,767	1,026,042
Pure potash ..... ,,	148,937	207,123	248,528

It will be seen that in 1923 there was an increase of about 20 per cent. in the output reckoned in pure potash and of more than 21 per cent. in the output of crude salts. The increase is particularly noticeable as regards chlorides, amounting to 25 per cent. in respect of chlorides with a content of 50 to 60 per cent. and of nearly 85 per cent. for those with a lower content.

From Week to Week

H. R. DAWSON AND CO., merchants and chemical engineers, 13, Bowlalley Lane, Hull, announce that on and after Saturday, March 1, their address will be Oberon Chambers, 54, Queen Street, Hull.

AN OUTBREAK OF FIRE occurred at the works of the Castner Kellner Company, Wallsend, on Wednesday, considerable damage being done to the electricians, shop and its contents.

MR. E. H. FARMER, of the Royal College of Science, London, has been awarded the degree of D.Sc. in chemistry in the University of London.

BRUNNER, MOND AND CO., LTD., have made a gift of £300 to the Department of Physics in the University of Manchester in aid of research.

PROFESSOR I. M. HEILBRON, at a meeting of the Birmingham and Midland Institute on Tuesday, lectured on "The Chemistry of the Living Cell."

LARGE SALES of nitrate of soda by the Nitrate Producers' Association are reported. Applications were received for a total of 329,000 tons, and the Association decided to sell 200,000 tons.

MR. EDWARD H. BOOMER, Ph.D., a graduate of the McGill University, who has been awarded the Canadian Fellowship of Chemical Science, valued at £600 sterling, will spend a year on research work in London.

DR. B. A. KEEN, assistant director of the Rothamstead experimental station, and Dr. J. I. O. Masson, lecturer at University College in organic chemistry, have been appointed Fellows of University College, London.

THE MELDOLA MEDAL for the year 1923 has been awarded to Mr. Cyril Norman Hinshelwood, B.A. (Oxon.), of Trinity College, Oxford, and will be presented at the annual general meeting of the Institute of Chemistry on Monday.

CLAYTON AND SHUTTLEWORTH, LTD., of Lincoln, in addition to the several contracts for water-tube boilers recently received, have now been successful in securing an order for additional boiler plant for the Ipswich Corporation Power Station.

A VISIT was paid on Friday, February 22, by members of the Liverpool and Manchester Sections of the Society of Chemical Industry to the dyeworks of Johnson Brothers (Dyers), Ltd., Bootle, where the dry cleaning, hat and feather dyeing, packing and other departments were seen.

MR. F. S. SINNATT, M.B.E., M.Sc. Tech., M.I.Min.E., has resigned his lectureship in fuels in the Faculty of Technology in the University of Manchester in consequence of his appointment as Assistant Director of the Fuel Research Board under the Department of Scientific and Industrial Research.

H. H. RIESER AND CO., "Norwich House," Southampton Street, London, W.C.1, announce that they have been appointed sole representatives for the Norse Electro-Chemical Works, manufacturers of carbide of calcium and ferro-silicon, with whom they have been connected for several years.

THE GOVERNMENT are stated to be considering the possibility of converting the Gretna munition factory for the production of potato spirit. This would provide large quantities of alcohol for use as fuel, and also have the advantage of lowering the price of alcohol for the chemical industries.

AT A MEETING of the Birmingham local section of the Institute of Metals on Saturday, February 16, Major S. J. Thompson, chairman of the Midland Branch of the Institute of Mechanical Engineers, said that a new metal was required of a much lighter and stronger nature than those at present in use.

THE NUMBER OF PERSONS on February 18, 1924, recorded on the live registers of the Employment Exchanges in Great Britain was 1,124,400. This was 29,239 less than on February 11, 1924, and 125,709 less than on December 31, 1923. The total included 834,000 men, 36,200 boys, 218,400 women and 35,800 girls.

REPARATION DELIVERIES are to be resumed by the Badische Anilin-und-Soda Fabrik for three months. It is to supply 3,600 tons of chemical manures, 600 of which go to Belgium. In consideration of this delivery, the French duty on the firm's exports to unoccupied territory will be reduced for this period to 1 per cent.

A NOVEL PLANT for the preparation of coal for the market has been completed and is working satisfactorily at William Pit, Whitehaven, the property of the Whitehaven Colliery Co. The machine, an American invention, and the first of its type to be erected in Great Britain, automatically separates the coal into six grades, all stone and impurities being rejected at the same time.

TWO PAPERS were read before the Physical and Chemical section of the University of Durham Philosophical Society in Armstrong College on Monday. The first was by Mr. L. F. Richardson, secretary of the Meteorological Society, on "The Differential Equations of Meteorology," and the second by Mr. J. F. Wood on "The Present Position of X-ray Crystal Analysis."

A DEPUTATION, representing 20 trade associations, was received at the Foreign Office on Wednesday by the Prime Minister. Representations were made for reduced taxation, the extension for a number of years of the Safeguarding of Industries Act, and the establishment of some definite basis of trade with Russia. An agreed statement of the Prime Minister's reply is to be issued.

NO STUDENT who violates the American prohibition or narcotic laws will be either graduated or promoted, according to an edict issued with the unanimous sanction of the forty-two members of the faculty and instructional corps of the Philadelphia College of Pharmacy and Science. This is understood to be the first declaration of the kind issued as a result of the present situation in the States.

AN ORDINARY SCIENTIFIC MEETING of the Chemical Society will be held on Thursday, March 6, at 8 p.m., when the following papers will be read:—"The reaction between lime and nitrogen peroxide," by Messrs. J. R. Partington and F. A. Williams; "Tellurium monoxide," by Messrs. J. J. Doolan and J. R. Partington; and "The dimorphism of diphenylarsenious chloride (diphenylchloroarsine)," by Messrs. C. S. Gibson and (the late) D. C. Vining.

THE NEW BATTERY of 60 "Wilputte" coke-ovens erected by the Coppee Co., Ltd., for the Consett Iron Co., Ltd., and just lighted up, represents the first attempt in this country to Americanise the British coke-oven industry. The walls are of pure silica bricks, and the chief points claimed for this new method of carbonising coals for coke and by-products are that the time required for carbonisation will be almost halved, labour costs will be reduced, and better though smaller coke will be produced.

THE TECHNICAL ADVERTISING SERVICE, the advertising consultants, whose service, based on a combination of technical knowledge and advertising ability, is being utilised increasingly by advertisers of chemical products and plant, announce that they are now settled at their new address, 52, Bedford Square, London. They wish to apologise to any of our readers who may have been inconvenienced by a delay in the installation of the telephone at the new address, and to point out that the number is now "Museum 64."

DR. I. M. HEILBRON, Professor of Organic Chemistry at Liverpool University, on Friday, February 22, gave a lecture before a joint meeting of the Liverpool and Manchester Sections of the Society of Chemical Industry, in which he said there was no reason why protoplasm and the living cell should not be synthetised. It would be a future problem for organic chemists, but he believed it would be possible. At the present time much was known of the nature of chlorophyll and hæmoglobin and their related compounds, thanks to the work of Willstätter, which was reviewed by thelecturer.

AT A MEETING of the Newcastle section of the Society of Chemical Industry, held in Armstrong College on Monday, a paper was read by Mr. C. H. Holmes (Carnegie Research Scholarship) on "Some Aspects of the Physical Testing of Moulding Sands for Foundries." It was announced by the secretary that the nominations made for the election of officials were: Chairman, Professor Haworth; vice-chairman, Professor Bristol; secretary, Mr. H. Dunford Smith; and treasurer, Mr. A. Trobridge. Mr. Smith also announced that it had been arranged to hold a joint dinner with the Institute of Chemistry and the Newcastle Chemical Industry Club on March 28.

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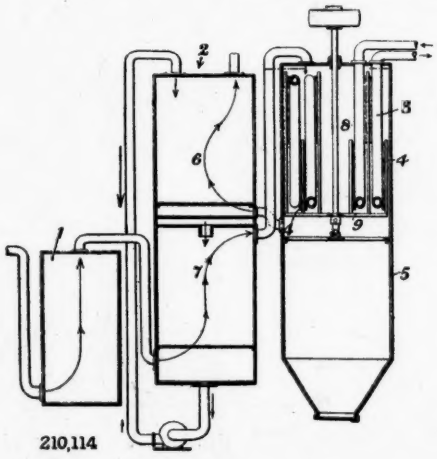
Abstracts of Complete Specifications

210,102. Hydrogen and Oxygen, Manufacture of. J. P. Scott, 2, Lonsdale Road, Toronto, Canada. Application date, July 25, 1922.

In the production of hydrogen and oxygen by the electrolysis of water it is usual to employ a current density of 0·2 to 0·25 ampere per square inch of electrode area, and the object of this invention is to use much greater current densities. For this purpose it is necessary to maintain the temperature at 50° C. or more, and the electrodes are of permeable material to permit circulation of the electrolyte and passage of the evolved gases. The electrodes may be of a porous material or may be apertured, *e.g.*, in the case of wire mesh. The distance apart of the electrodes should preferably be not more than $\frac{1}{8}$th of an inch, and a separating diaphragm is used where the hydrogen and oxygen are to be collected separately. The electrolyte is preferably a solution containing about 17 per cent. of caustic soda. The electrolyte may be heated by the current, the temperature being kept below the boiling point to avoid heat loss due to the generation of steam. The preferred current density is 1·5 to 3 amperes per square inch, but if a larger current is employed it may be necessary to circulate the electrolyte by means of a pump. In an example, the temperature is maintained at 75°–85° C. with electrodes $\frac{1}{8}$th of an inch apart operating with a current density of about 2 amperes per square inch, which requires slightly over 2 volts per cell. If the temperature is increased to 90°–95° C. about 3 amperes density may be used at 2·5 volts.

210,114. Recovering Benzol Contained in Coal Gas, Process and Apparatus for. J. E. Aguillon, 19, Rue de la Rochefoucauld, Paris. Application date, September 19, 1922.

Benzol is recovered from coal gas by passing the gas over metal surfaces cooled to -50° C. The benzol condenses in the form of a snow and is removed mechanically by means of scrapers. The residue of benzol left in the coal gas is only about 4 grams per cubic metre. The gas passes first into a condenser 1, where it is cooled to about 0° C., and the water



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and naphthalene condensed. The condenser may be tubular, with liquefied gas as a cooling agent, or may be a column containing Raschig rings over which a cooling liquid trickles. The gas then passes through a heat exchanger 2, and then over a set of tubes 3, which are cooled to –50° C. by the expansion of liquid carbon dioxide. The condensed benzol is removed by mechanical scrapers 4, and is collected in a vessel 5. If this vessel is maintained slightly above 0° C. the benzol may be removed in a liquid state. The cold coal gas is then passed through the heat exchanger 2, where it cools the incoming gas. The device 2 may consist of two columns 6 and 7, with Raschig rings, the cooling effect being obtained by the circulation of calcium chloride solution. The solution is cooled in a chamber 6, and cools the incoming gas in the chamber 7. The solution from the chamber 7 may be filtered to remove tar and naphthalene. The tubes 3 are arranged vertically in such a manner that the benzol may be removed from them by the revolution of a scraper 4 mounted on a shaft 8.

210,120. β-Naphthol–2 : 3 : 6– and 2 : 6 : 8–Disulphonic Acids, Manufacture of. C. L. Masters, of Southern Dyestuffs Co., Nitro, W. Va., U.S.A. Application dates, September 27, 1922, and June 27, 1923.

In the sulphonation of β-naphthol, the process may be so conducted as to obtain the maximum proportion of either the 2-naphthol-3 : 6-disulphonic acid, or the 2-naphthol-6 : 8-disulphonic acid, and the object is to separate the constituents from this mixture. The sulphonation mixture is treated with potassium sulphate, and then with sufficient calcium hydroxide to neutralise the mixture. The resulting calcium sulphate is filtered off, and the filtrate consists of a mixture of the dipotassium salts of the two acids. It has been found that the dipotassium salt of the 2-naphthol-6 : 8-disulphonic acid is only slightly soluble in a concentrated solution of the dipotassium salt of the 2-napthol-3 : 6-disulphonic acid, so that in concentrating and cooling the solution, the former salt separates out. If the dipotassium salt of the 2-naphthol-3 : 6-disulphonic acid is boiled with excess of calcium hydroxide, the acid is converted into an insoluble basic calcium-potassium salt, which is filtered, washed, suspended in water, and treated with sulphuric acid to precipitate the calcium sulphate. The solution is then treated with sodium chloride to salt out the 2-naphthol-3 : 6-disulphonic acid. These products are of a high degree of purity.

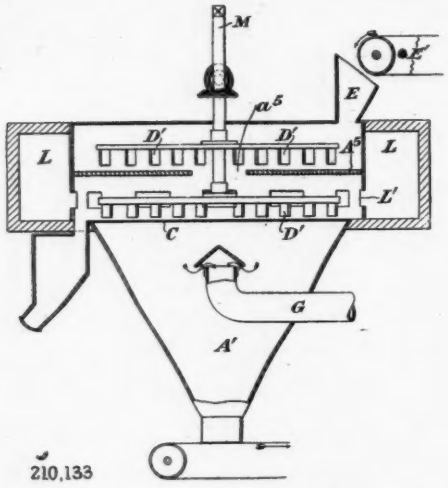
210,131. Hydrocarbons of Relatively Low Boiling Point, Process of Producing. E. C. R. Marks, London. From Chemical Research Syndicate, Ltd., 7644, Woodward Avenue, Detroit, Mich., U.S.A. Application date, October 17, 1922.

Specification No. 174,574 (see The Chemical Age, Vol. VI., p. 433) describes a process of treating high-boiling hydrocarbons by vaporising them, mixing with steam and subjecting to the action of ferrous oxide at high temperature, the proportion of steam and hydrocarbon being regulated to prevent oxidation of the ferrous oxide. In the present invention, the vapours of benzol and like aromatic hydrocarbons are subjected to similar treatment, the hydrocarbons being hydrogenated with the production of cyclohexane and like saturated ring compounds. The aromatic compounds, *e.g.*, benzene, toluene, xylene, etc., and their homologues, are mixed with a paraffin or olefin hydrocarbon, and the vapours passed with superheated steam over ferrous oxide heated to 550° to 700° C. The ferrous oxide is oxidised to ferric oxide by the steam with liberation of nascent hydrogen, and the saturated hydrocarbon compounds are dehydrated to unsaturated compounds by ferric oxide. These unsaturated compounds are split up into simpler hydrocarbons such as ethylene, and these react with ferric oxide yielding ferrous oxide, carbon and water. Some of the ferric oxide is reduced to ferrous oxide by the carbon with formation of carbon monoxide, and this reacts with ferric oxide to produce ferrous oxide and carbon dioxide. Steam reacts with ferrous oxide liberating hydrogen, which replaces the methyl group and carries on the hydrogenation up to the formation of cyclo-paraffins. In an example, a mixture of aromatic and paraffin or olefin compounds produced by vaporising an oily distillate from coal or coke oven tars, is treated by this process yielding a motor spirit free from water and composed principally of cyclohexane, light paraffins, some cyclo-olefins and cyclo-paraffins, and some unchanged aromatics. The exact amount of steam required should be employed, and after the treatment the oxide used should, on analysis, contain neither carbon nor ferric oxide.

210,133. Drying Ores, Concentrates and other Granular Materials, Process and Apparatus for. G. Rigg, Collins House, 360, Collins Street, Melbourne, and W. J. McBride, The Broken Hill South, Ltd., Broken Hill, N.S.W., Australia. Application date, October 17, 1922.

In this apparatus a layer of the wet or damp ore or concentrate is formed on a bed of porous material, and a current of

hot air and/or gas is passed downwards through the material on the bed. The latter is of such a nature that the ore is retained on its surface when damp, but readily passes through it when dry. The porous bed may be formed of a layer of balls of burnt clay, pebbles, iron balls or the like, supported on a screen of metal or woven wire. In the case of ore concentrates which



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pass through a forty-mesh screen, the balls or pebbles should be of ¼th to ½th of an inch diameter in a layer of about an inch in thickness. The screen should be fine enough to retain the balls but coarse enough to allow the dried ore to pass through.

The screen C carrying the porous bed is surrounded by an annular chamber L, having communicating ports L^1. A horizontal diaphragm A^5, having a central aperture a^5, is arranged above the screen, and a vertical shaft M carries two sets of rotating blades or rabbles D^1 in the two chambers thus formed. The material is supplied through the hopper E, and is conveyed to the central aperture a^5 by the upper series of blades D^1, and is then distributed over the screen C by the lower series of blades. Hot gases are drawn downwards through the ore by means of a fan in the exhaust pipe G, and the dried ore passes into a chamber A^1 and thence to a conveyor. Any tendency to clogging of the porous bed is avoided by the restricted movements of the balls, but if fine concentrates are treated, the layer must not be too deep, to avoid concentration of moisture from the upper layers on the lower layers and reduction of the porosity of the bed. Modifications of the apparatus are described in which the porous bed is arranged in a trough, and also in which it is arranged within a perforated rotating cylinder.

210,217 and 210,347. Azo-Dyestuffs, Manufacture of. A. G. Bloxam, London. From Chemische Fabrik. Griesheim-Elektron, Frankfurt-on-Main, Germany. Application dates, November 23, 1922, and June 1, 1923.

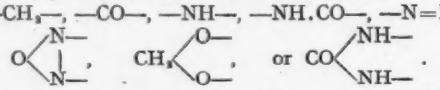
210,217. Azo-dyestuffs insoluble in water are obtained by combining a diazo compound not containing a sulphonic or carboxylic group with a diacyl-acetyl compound of the general formula :

$$Y.CO.CH_2.CO.NH.X.NH.CO.CH_2.CO.Y$$

where Y is a radicle of the aliphatic or aromatic hydrocarbon series, and X is an aromatic residue, *i.e.*, an aryl residue or substituted aryl residue ; a diaryl residue or a substituted diaryl residue ; or a residue of a diaryl compound of the general formula

where R and R_1 are the same or different aryl residues or substituted aryl residues, and Z is a link such as

O, S, —CH_2—, —CO—, —NH—, —NH.CO—, —N=N—,



The diacyl-acetyl compounds of diamino bases may be obtained by heating together in a solvent or diluent an acyl acetic acid ester with a diamine of the general formula $NH_2—X—NH_2$. It has been found that the diacyl-acetyl compounds of the diamino bases have an affinity for cotton so that the dyestuffs may be produced on the fibre by impregnating with an alkaline solution of a diacyl-acetyl compound of the diamino base, and then treating without drying with a diazo compound. Suitable diazo compounds are those of aniline and its homologues and substitution products such as toluidines, anisidines, chloro- and nitro-anilines, chloro- and nitro-toluidines, chloro- and nitro-anisidines, and those of naphthylamines, amino-anthraquinones, amino-azo compounds, diamido bases, and others. Suitable azo components are a condensation product of two molecular proportions of acetoacetic acid ester or a homologue or analogue such as benzoyl acetic acid ester, with a diamino base, such as paraphenylene-diamine, a naphthylene-diamine or a diamino-anthraquinone ; or with a base of the diphenyl series, benzidine, and its derivatives, substituted in the diphenyl residue ; or with thioaniline, diamino-diphenyl ether, diamino-diphenyl-methane, diamino-diphenylamine, diamino-azobenzene, diamino-azoxybenzene, diamino-diphenyl-urea, aminobenzoyl-phenylene-diamine, and others.

210,347. Insoluble azo dyestuffs are obtained by combining a diazo-tetrazo, or diazo-azo-compound not containing a sulphonic or carboxylic group with a mono-acyl-acetyl derivative of amino-bases having the formula :—

$$NH_2—R—X—R^1.$$

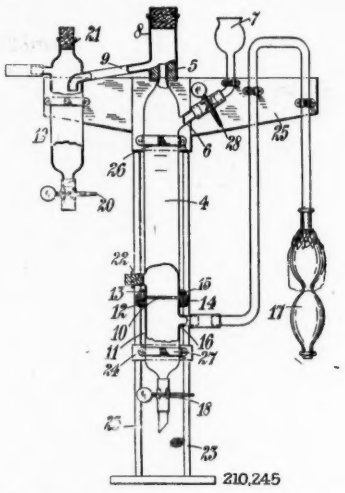
where R and R^1 are the same or different aryl residues, or R^1 may be a heterocyclic or acyclic residue containing a methylene group capable of combining with diazo compounds, and X is an azo-or azoxy-group or the residue of a five-membered heteroatomic nucleus. Suitable diazo compounds are those of aniline and its homologues and substitution products, such as toluidines, anisidines, chloro- and nitro-anilines, chloro- and nitro-toluidines, chloro- and nitro-anisidines, and those of naphthylamines, aminoanthraquinones, amino-azo compounds, diamido bases, such as dianisidine, dichlorobenzidine, diamino-diphenyl ether, diamino-azo- and diamino-azo-oxy compounds.

The mono-acyl-acetyl derivatives are obtained by heating aceto acetic acid ester, benzoyl-acetic acid ester, or other homologue or analogue with a mono-amino base as above indicated, and a solvent or diluent. Products mentioned are amino-azoxy compounds, which may be substituted, amino-azo compounds, *e.g.*, amino-azo-benzene, its homologues, analogues or substitution products which are obtained by combining a diazo compound with an amine capable of being coupled, and those which are obtained by the combination of diazotised nitro- or acylamino-substitued amino bases with phenols or substances containing a methylene group capable of combining with diazo compounds such as methyl-phenyl-pyrazolones and derivatives of β-ketone-aldehydes, *e.g.*, derivatives of aceto-acetic acid, acetyl-acetone, etc., and the subsequent saponification or reduction of the products. The group containing the residue of a five-membered heteroatomic nucleus includes substances such as the amino-substituted phenyl-pseudo-azimino benzenes, phenyl-benzothiazoles, and phenyl-benziminazoles. These dyestuffs can be produced on the fibre by impregnating with a mono-acyl-acetyl derivative as specified above, and then treating with a diazo-, tetrazo-, or diazo-azo-compound not containing a sulphonic or carboxylic group.

210,245. Froth Flotation Test Apparatus. H. L. Sulman and H. F. K. Picard, 44, London Wall, London, E.C.2. Application date, December 15, 1922.

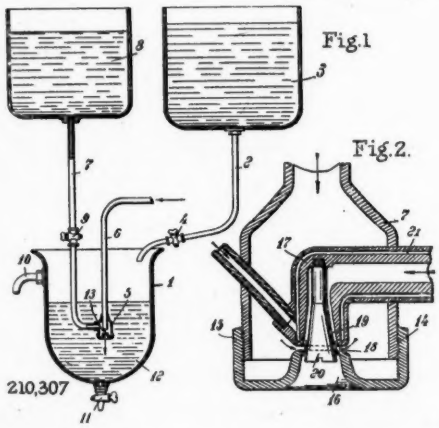
This apparatus is for facilitating the testing of small quantities of materials by froth flotation. The material is supplied through a funnel 7 to a glass tube 4 which is constricted at 5 and secured to a larger tube 8 closed at the top and having a branch 9 to discharge the froth. The bottom of the tube 4 is closed by a porous partition 10, preferably of earthenware. A separate chamber 11 is secured below the partition, and is connected to a hand bellows 17, while the outlet is provided with a tap 18. The froth is collected in a vessel 19 provided with a similar outlet tap 20. An outlet 22 is provided for tailings. The froth is produced in the tube 4 by an upward current of air-bubbles produced by the bellows 17, and the operation can be watched while proceeding. The material is subjected to a preliminary treatment in a shaking vessel, which enables some of the mineral to be removed. The froth produced in the tube 4 is very voluminous, and the operation is

continued until no more mineral settles out in the vessel 19. The flotation reagents, *e.g.*, pine oil, eresol, etc., are preferably emulsified with water before use.



210,307. Emulsions, Suspensions and Similar Disperse Systems, Continuous Production of. C. A. Agthe, 14, Seefeldstrasse, Zurich, Switzerland. Application date, March 1, 1923.

The receptacle 1 contains a dispersion medium which is supplied from a reservoir 3, and an atomising device 5 is submerged in the liquid. Steam is supplied through a pipe 6, and the substance to be dispersed through a pipe 7 from a reservoir 8. The steam atomises the liquid from the reservoir in passing



through the outlet nozzle 13, and passes into the liquid carrying with it the fine particles of liquid. A suitable construction of atomising nozzle is shown in Fig. 2. The liquid to be atomised is supplied through the pipe 7, and steam through the pipe 21 and annular nozzle 19 formed by a central member 20. Atomising takes place in the annular gap 18, and the mixture is delivered through the passage 16 into the dispersion medium.

210,363. Colloidal Sulphur, Process for the Manufacture of. H. Vogel, Premnitz, near Rathenow, Westhavelland, Prussia. Application date, July 14, 1923. Addition to 202,613.

Specification 202,613 (See The Chemical Age, Vol. IX., p. 432) describes the production of colloidal sulphur by passing sulphur dioxide and sulphretted hydrogen into water containing a protective colloid and kept at a temperature of 3—4° C. It is now found that stronger solutions of finer dispersion can be obtained by using an excess of sulphur dioxide so that some polythionic acid is produced. If the colloidal solution is treated with excess of hydrosulphuric acid, part of the sulphur is deposited as a green paste of colloidal sulphur, which is soluble in water. The highly concentrated solution standing above is of greater fineness.

Note.—Abstract of the following specification which is now accepted appeared in The Chemical Age when it became open to inspection under the International Convention: 195,947 (Henkel et Cie and W. Weber) relating to a process for treating iron chloride lyes, see Vol. VIII., p. 626.

Latest Notifications.

211,454. Process of manufacture of absolute alcohol. Soc. Ricard, Allenet, et Cie. February 15, 1923.

211,487. Treatment of hydrocarbons. Schwarz, A. February 13, 1923.

211,488. Manufacture of sodium sulphide. Freeman, H., and Canada Carbide Co., Ltd. February 14, 1923.

211,494. Compounding of rubber and similar materials. Naugatuck Chemical Co. July 13, 1922.

211,507. Manufacture of salts of chrome. Soc. Anon. Compagnie Générale des Produits Chimiques de Louvres. February 16, 1923.

Specifications Accepted, with Date of Application

194,676. Precipitates from solutions, Process and apparatus for the production of coarse. Aktieselskapet de Norske Saltverker. March 11, 1922. Addition to 171,370.

197,341. Condensing distilled vapours, Apparatus for. G. de Bethune. May 8, 1922.

199,706. Green dye-stuffs dyeing in reducing baths, and their process of manufacture. Soc. Chimique de la Grande Paroisse. June 22, 1922.

204,722. Diamino-diaryldialkyl-methanes, Manufacture of. Farbwerke vorm. Meister, Lucius and Brüning. September 29, 1922.

210,703. Colouring matters, Production of. M. O. Davies, R. F. Thomson, J. Thomas, and Scottish Dyes, Ltd. August 3rd, 1922. Addition to 193,431.

210,809. Amides of alkylated acids, Manufacture of. O. Y. Imray. (*Farbwerke vorm. Meister, Lucius and Brüning*). August 12, 1922.

210,824. Ores, Preparation of, for leaching process. C. Hennes. October 10, 1922.

210,855. Liquids and solids, Means for separating the liquid and solid components of mixtures of. A. J. Arbuckle. November 6, 1922.

210,870. Cementation of iron and steel. A. Gronquist. November 8, 1922.

210,890. Azo dyestuffs and chromium compounds thereof, Manufacture of. O. Y. Imray. (*Soc. of Chemical Industry in Basle*). November 11, 1922.

210,909. Tar and like liquid hydrocarbons, Treatment of. A. W. H. Vivian. November 24, 1922.

210,972. Cracking petroleum products, Methods of and apparatus for. C. Kroll. January 29, 1923.

211,005. Metals, Process for precipitating or recovering—from their solutions. H. Bardt. February 27, 1923. Addition to 194,339.

211,033. Shale and the like, Destructive distillation of—to obtain oil therefrom. S. G. S. Dicker. (*S.E. Co.*) April 3, 1923.

Applications for Patents

Badische Anilin- and Soda-Fabrik and Johnson, J. Y. Manufacture of hydrocyanic acid and cyanides. 4,284. February 19.

Borchers, W., and Stimson, R. W. Production of alloys containing iron and molybdenum or uranium. 4,570. February 22.

Brown, L. Venn-. Simultaneous production of iron-oxide pigment and hydrochloric acid. 4,175. February 18.

Chemical Engineering and Wilton's Patent Furnace Co., Ltd., Wilton, N., Wilton, T. O. Manufacture of sulphate of ammonia. 4,397. February 20.

Evans, A. J. Recovery of zinc and copper from alloys. 4,553. February 22.

Farbwerke vorm. Meister, Lucius, and Brüning, and Imray, O. Y. Manufacture of vat dyestuffs. 4,402. February 20.

Ges. für Chemische Produktion. Method of manufacturing highly-active adsorption carbon. 4,628. February 22. (Czecho-Slovakia, February 22, 1923.)

Hall, A. J., and Silver Springs Bleaching and Dyeing Co., Ltd. Manufacture and application of dyestuffs. 4,542. February 22.

Hereward, H. W., Scottish Dyes, Ltd., and Thomas, J. Production of hydroxyanthraquinones. 4,173. February 18.

Naamlooze Vennootschap Algemeene Norit Maatschappij, and Potts, H. E. Manufacture of active carbon. 4,529. February 22.

Peachey Process Co., Ltd., and Peachey, S. J. Vulcanisation of rubber. 4,658. February 23.

Skappel, H. Recovery of metals from their compounds. 4,518. February 21. (Norway, February 26, 1923.)

Synthetic Ammonia and Nitrates, Ltd. Manufacture of combustible gases. 4,649. February 23.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

London, February 28, 1924.

BUSINESS has continued along fairly active lines during the current week, and with a settlement of the dock strike prices have steadied without any weakness becoming apparent. It is, of course, too early to state what effect the alteration in the Reparations levy may have on the prices for imported products, but it is not expected that values will be materially influenced.

Prices generally continue extremely firm. Export trade is fair, and there is a good volume of inquiry in the market.

General Chemicals

ACETONE is a shade easier, but trade is quite good.
ACID ACETIC continues exceedingly strong and is in good demand.
ACID CITRIC is firmer.
ACID FORMIC continues scarce.
ACID LACTIC is unchanged in value but in better demand.
ACID OXALIC is firm and only in moderate supply.
ACID TARTARIC maintains its advance and is in much better request.
BARIUM CHLORIDE is still unchanged.
BLEACHING POWDER is unchanged.
FORMALDEHYDE.—Stocks continue small, and prices remain firm.
LEAD ACETATE is very firm, and some substantial business has been placed on forward account.
LIME ACETATE.—Business is not quite so active but price is well maintained.
LITHOPONE is in fair request without change in value.
METHYL ALCOHOL continues in short supplyan d price is extremely firm.
POTASSIUM CARBONATE and CAUSTIC.—A fair demand is reported.
POTASSIUM PERMANGANATE.—A fair business is being transacted without change in value.
POTASSIUM PRUSSIATE.—The outlook is much better, and a satisfactory forward business has been booked.
SODIUM ACETATE continues firm and scarce.
SODIUM BICHROMATE is unchanged.
SODIUM NITRITE.—Stocks are small and price continues very firm.
SODIUM PHOSPHATE is a shade better and demand is good.
SODIUM PRUSSIATE.—The position here is much firmer and buyers are taking much more interest on forward account.
SODIUM SULPHIDE continues in good request, and price is without change.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID.—Price is unchanged, demand begin slow.
ACETANILID.—Remains quite firm.
ACID SALICYLIC.—Demand is poor, market easy.
ACID TANNIC LEVISS.—List prices are shaded for important orders.
BROMIDES continue easy, but higher prices are foreshadowed in due course.
EUCALYPTUS OIL is being cut in some directions.
HEXAMINE is in fair demand with a firm tendency.
METHYL SALICYLATE is easy on the spot, although Continental makers report their production sold well ahead at last prices.
PHENACETIN tends to harden.
PHENAZONE.—Lower-priced parcels are passing into consumption, a fair demand being reported.
PHENOLPHTHALEIN seems steadier.
SODA SALICYLATE has been in good demand.
VANILLIN.—Slow, price unchanged.

Coal Tar Intermediates

Business continues on moderate lines, while fair inquiry for export is in evidence.
ALPHA NAPHTHOL is of interest for home trade.
ALPHA NAPHTHYLAMINE.—Some business has been passing and there is more inquiry for export account.
ANILINE OIL AND SALT continues with fair interest in both home and export markets.
BENZIDINE BASE.—Some business has been placed for home trade.
BETA NAPHTHOL continues on quiet lines.
DIMETHYLANILINE is without special feature.
DIPHENYLAMINE has been inquired for on export account, and the price is unchaged.
" H " ACID.—Some home trade business has been passing.
NITRO BENZOL is inquired for on export account, while home trade continues on moderate lines.
PARANITRANILINE is unchanged.
" R " SALT is without change in value and in moderate request.
XYLIDINE has been of small interest.

Coal Tar Products

The market generally in coal tar products is fairly steady.
90% BENZOL is firm at 1s. 6d. per gallon on rails.
PURE BENZOL is quoted at 1s. 10d. per gallon on rails.
CREOSOTE OIL is stationary at 8¼d. to 8½d. per gallon on rails in the North, and the price in London is 9d. to 9¼d. per gallon.
CRESYLIC ACID is firm at 1s. 10d. to 1s. 11d. per gallon for the pale quality 97/99%, while the Dark quality 95/97% is quoted at 1s. 7d. to 1s. 8d. per gallon.
SOLVENT NAPHTHA is also firm at 1s. to 1s. 1d. per gallon on rails.
HEAVY NAPHTHA is also quoted at 1s. per gallon on rails.
NAPHTHALENES are steady, the lower qualities being worth from £7 to £7 10s. per ton, 74/76 melting point £8 to £8 10s. per ton, and 76/78 quality at £9 to £9 10s. per ton.
PITCH is receiving a little more attention and the market is somewhat firmer. To-day's quotations are :—65s. f.o.b. London, 62s. 6d. to 65s. f.o.b. East and West Coast.

Sulphate of Ammonia

The demand is well maintained and prices remain unaltered

Artificial Silk Sold as Real

Difficulty of Distinction without Analysis

IT was stated on behalf of the prosecution, brought by the National Federation of Hosiery Manufacturers' Association against Selfridge and Co., Ltd., at the Marlborough Street Police Court, London, on Thursday, February 21, that certain stockings sold as " silk " were chemically and microscopically examined at a bureau in Nottingham, and it was discovered that they were composed of a vegetable substance—viscose. Messrs. Selfridge, immediately the matter was drawn to their notice, withdrew the whole stock, explaining that they had been misled by the very close resemblance of the stockings to silk, and gave every information and facility in the matter. An expert witness for the prosecution was shown some stockings. He said, answering Mr. Frampton (for the defendants), that the leg of one pair was extremely inferior silk, " heavily loaded with tin." Another he described as made of pods of cotton pulp treated with resin, a process originating in Germany.

The case for the prosecution having concluded, the defence called Mr. Edward Pratt, of Bradford, textile chemist and analyst, who said the pair of stockings produced could easily be mistaken by an expert for silk, without chemical examination. They were very deceptive. He explained that silk could be detected by burning and by chemical and microscopical examination.

The hearing was adjourned.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride, 90–95%	lb.	0	1	4	to	0	1	5
Acetone oil	ton	80	0	0	to	85	0	0
Acetone, pure	ton	120	0	0	to	123	0	0
Acid, Acetic, glacial, 99–100%	ton	73	0	0	to	74	0	0
Acetic, 80% pure	ton	51	0	0	to	53	0	0
Acetic, 40% pure	ton	26	0	0	to	27	0	0
Arsenic, liquid, 2000 s.g.	ton	85	0	0	to	88	0	0
Boric, commercial	ton	48	0	0	to	52	0	0
Carbolic, cryst. 39–40%	lb.	0	0	7¾	to	0	0	8
Citric	lb.	0	1	5½	to	0	1	6
Formic, 85%	ton	67	10	0	to	70	0	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.	ton	39	0	0	to	40	0	0
Lactic, 60 vol.	ton	45	0	0	to	47	0	0
Nitric, 80 Tw.	ton	23	0	0	to	25	0	0
Oxalic	lb.	0	0	5¾	to	0	0	6
Phosphoric, 1.5	ton	35	0	0	to	38	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, technical	lb.	0	1	9½	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	1	to	0	1	1½
Alum, lump	ton	12	10	0	to	13	0	0
Chrome	ton	23	0	0	to	24	0	0
Alumino ferric	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14–15%	ton	8	10	0	to	9	0	0
Sulphate, 17–18%	ton	10	10	0	to	11	0	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
.880	ton	32	0	0	to	34	0	0
.920	ton	22	0	0	to	24	0	0
Carbonate	ton	30	0	0	to	32	0	0
Chloride	ton	50	0	0	to	55	0	0
Muriate (galvanisers)	ton	32	0	0	to	33	0	0
Nitrate (pure)	ton	40	0	0	to	45	0	0
Phosphate	ton	63	0	0	to	65	0	0
Sulphocyanide, commercial 90%	lb.	0	1	4	to	0	1	5
Amyl acetate, technical	ton	280	0	0	to	300	0	0
Arsenic, white powdered	ton	66	0	0	to	68	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Carbonate, Precip.	ton	15	0	0	to	16	0	0
Chlorate	ton	65	0	0	to	70	0	0
Chloride	ton	14	10	0	to	15	0	0
Nitrate	ton	37	0	0	to	40	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	0	11	to	0	1	0
Bleaching powder, 35–37%	ton	10	0	0	to	10	10	0
Borax crystals, commercial	ton	25	0	0	to		—	
Calcium acetate, Brown	ton	13	0	0	to	14	0	0
Grey	ton	22	0	0	to	23	0	0
Carbide	ton	13	0	0	to	13	10	0
Chloride	ton	5	15	0	to	6	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	80	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	1	to	0	1	2
Sulphate	ton	25	0	0	to	25	10	0
Cream Tartar, 98–100%	ton	77	0	0	to	80	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	65	0	0	to	66	0	0
Formusol (Rongalite)	lb.	0	1	11	to	0	2	0
Glauber salts, commercial	ton	4	0	0	to	4	10	0
Glycerin crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal	0	2	0	to	0	2	1
Iron perchloride	ton	20	0	0	to	22	0	0
Sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	47	0	0	to	48	0	0
Carbonate (White Lead)	ton	50	0	0	to	52	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	50	0	0	to	51	0	0
Lithophone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	4	0	0	to	4	5	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	5	15	0	to	6	0	0
Sulphate (Druggists')	ton	9	0	0	to	10	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	45	0	0	to	48	0	0
Methyl acetone	ton	82	0	0	to	85	0	0
Alcohol, 1% acetone	ton	85	0	0	to	86	0	0
Nickel sulphate, single salt	ton	37	0	0	to	38	0	0
Ammonium sulphate, double salt	ton	37	0	0	to	38	0	0
Potash, Caustic	ton	33	0	0	to	34	0	0
Potassium bichromate	lb.	0	0	5¾	to		—	
Carbonate, 90%	ton	30	0	0	to	31	0	0
Chloride, 80%	ton	9	0	0	to	10	0	0
Chlorate	lb.	0	0	3½	to		—	
Metabisulphite, 50–52%	ton	63	0	0	to	65	0	0
Nitrate, refined	ton	38	0	0	to	40	0	0
Permanganate	lb.	0	0	9½	to	0	0	10
Prussiate, red	lb.	0	2	0	to	0	2	3
Prussiate, yellow	lb.	0	0	9½	to	0	0	10
Sulphate, 90%	ton	10	0	0	to	10	10	0
Salammoniac, firsts	cwt.	2	15	0	to		—	
Seconds	cwt.	2	17	6	to		—	
Sodium acetate	ton	25	0	0	to	25	10	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4½	to		—	
Bisulphite, 60–62%	ton	20	0	0	to	22	0	0
Chlorate	lb.	0	0	2¾	to	0	0	3
Caustic, 70%	ton	17	10	0	to	18	0	0
Caustic, 76%	ton	18	10	0	to	19	0	0
Hydrosulphite, powder	lb.	0	1	6	to	0	1	7
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	31	0	0	to	32	0	0
Phosphate, crystal	ton	16	0	0	to	16	10	0
Perborate	lb.	0	0	11	to	0	1	0
Prussiate	lb.	0	0	5¾	to	0	0	6
Sulphide, crystals	ton	8	10	0	to	9	0	0
Sulphide, solid, 60–62%	ton	15	0	0	to	16	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium carbonate	ton	50	0	0	to	55	0	0
Nitrate	ton	50	0	0	to	55	0	0
Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Flowers	ton	11	0	0	to	11	10	0
Roll	ton	9	15	0	to	10	10	0
Tartar emetic	lb.	0	1	0	to	0	1	1
Tin perchloride, 33%	lb.	0	1	1	to	0	1	2
Perchloride, solid	lb.	0	1	3	to	0	1	4
Protochloride (tin crystals)	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw.	ton	20	0	0	to	21	0	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	42	0	0	to	45	0	0
Dust, 90%	ton	50	0	0	to	55	0	0
Sulphate	ton	15	0	0	to	16	0	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	3	6	to	0	3	9
Acetanilid	lb.	0	3	0	to	0	3	3
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	10	to	0	3	3
Salicylic, B.P.	lb.	0	2	2	to	0	2	4
Tannic, leviss	lb.	0	3	0	to	0	3	3
Amidol	lb.	0	7	6	to	0	8	0
Amidopyrin	lb.	0	13	9	to	0	14	3
Ammon ichthosulphonate	lb	0	1	10	to	0	2	0
Barbitone	lb.	0	17	0	to	0	17	6
Beta naphthol resublimed	lb.	0	3	0	to	0	3	6
Bromide of ammonia	lb.	0	0	10	to	0	0	11
Potash	lb.	0	0	8	to	0	0	8½
Soda	lb.	0	0	8½	to	0	0	9
Caffeine, pure	lb.	0	12	3	to	0	12	9
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Lactate	lb.	0	2	0	to	0	2	3
Calomel	lb.	0	3	4	to	0	3	6
Chloral hydrate	lb.	0	3	10	to	0	4	0
Cocaine alkaloid	oz.	1	2	0	to	1	4	0
Hydrochloride	oz.	0	17	0	to	0	17	6
Corrosive sublimate	lb.	0	2	10	to	0	3	0
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	2	3	to	0	2	4
B.P. (75–80% eucalyptol)	lb.	0	2	4	to	0	2	6
Guaiacol carbonate	lb.	0	13	0	to	0	13	3
Liquid	lb.	0	11	6	to	0	12	0
Pure crystals	lb.	0	12	6	to	0	13	0
Hexamine	lb.	0	4	0	to	0	4	3
Hydroquinone	lb.	0	4	0	to	0	4	3
Lanoline anhydrous	lb.	0	0	7	to	0	0	6
Lecithin ex ovo	lb.	1	5	0	to	1	7	6
Lithi carbonate	lb.	0	9	6	to	0	10	0
Methyl salicylate	lb.	0	2	10	to	0	3	3
Metol	lb.	0	9	0	to	0	10	0
Milk sugar	cwt.	4	5	0	to	4	10	0
Paraldehyde	lb.	0	1	6	to	0	1	9
Phenacetin	lb.	0	7	0	to	0	7	3
Phenazone	lb.	0	7	6	to	0	8	0
Phenolphthalein	lb.	0	7	9	to	0	8	0
Potassium sulpho guaiacolate	lb.	0	6	3	to	0	6	9
Quinine sulphate, B.P.	oz.	0	2	3	to		—	

	Per	£	s.	d.		£	s.	d.
Resorcin, medicinal	lb.	0	6	0	to	0	6	6
Salicylate of soda powder	lb.	0	2	10	to	0	3	0
Crystals	lb.	0	3	0	to	0	3	3
Salol	lb.	0	4	0	to	0	4	3
Soda Benzoate	lb.	0	3	3	to	0	3	6
Sulphonal	lb.	0	17	6	to	0	18	3
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	12	0	to	0	12	3
Soda salicylate	lb.	0	8	6	to	0	9	0
Vanillin	lb.	1	4	6	to	1	5	6

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	1	9	to	0	2	0
Refined	lb.	0	2	3	to	0	2	6
Alphanaphthylamine	lb.	0	1	6½	to	0	1	7
Aniline oil, drums extra	lb.	0	0	8½	to	0	0	8¾
Salts	lb.	0	0	9	to	0	0	9½
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	2	9	to	0	3	0
Benzidine, base	lb.	0	4	4	to	0	4	7
Sulphate	lb.	0	3	4	to	0	3	7
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Crocein Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	10	to	0	0	11
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	3	to	0	1	4
Dinitrophenol	lb.	0	1	6	to	0	1	7
Dimethylaniline	lb.	0	2	8	to	0	2	10
Diphenylamine	lb.	0	3	3	to	0	3	6
H-Acid	lb.	0	4	6	to	0	4	9
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	8	6	to	0	9	6
Naphthionic acid, crude	lb.	0	2	4	to	0	2	6
Naphthionate of Soda	lb.	0	2	4	to	0	2	6
Naphthylamine-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	7	to	0	0	8
Nitronaphthalene	lb.	0	0	11½	to	0	1	0
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	9	to	0	0	10
Paranitraniline	lb.	0	2	6	to	0	2	8
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	6	to	0	5	9
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	9	to	0	0	10
Tolidine, base	lb.	0	7	3	to	0	7	9
Mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils.		£	s.	d.
Anise	c.i.f. 1/9 spot	0	1	10
Bay		0	10	6
Bergamot		0	15	0
Cajuput		0	3	3
Camphor, white	per cwt.	3	15	0
Brown	„	3	10	0
Cassia	firmer, c.i.f. 8/0 spot	0	8	9
Cedarwood	firmer	0	1	6
Citronella (Ceylon)	firmer, c.i.f. 3/3 spot	0	3	8
(Java)	c.i.f. 4/6 spot	0	4	9
Clove		0	8	9
Eucalyptus		0	2	3
Geranium Bourbon		1	10	0
Lavender	easier	1	5	0
Lavender Spike		0	5	0
Lemon		0	3	1
Lemongrass	per oz.	0	0	2¼
Lime (distilled)		0	4	6
Orange sweet (Sicilian)		0	11	6
(West Indian)		0	9	6

		£	s.	d.
Palmarosa		0	18	0
Peppermint (American)		0	16	0
Mint (dementholised Japanese)		0	14	0
Patchouli		1	2	6
Otto of Rose	per oz.	1	15	0
Rosemary		0	1	11
Sandalwood		1	5	0
Sassafras		0	10	6
Thyme	2/6 to	0	8	0

Synthetics.				
Benzyl acetate	per lb.	0	3	3
Benzoate	„	0	3	6
Citral	firmer „	0	10	0
Coumarine	„	1	0	0
Heliotropine	„	0	8	0
Ionone	„	1	5	0
Linalyl acetate	„	1	2	6
Methyl salicylate	firmer „	0	2	10
Musk xylol	„	0	18	0
Terpeniol	„	0	2	9

Bureau of Chemical Abstracts

As already announced, the Bureau of Chemical Abstracts was formed in the latter part of 1923, as the result of a joint agreement between the Councils of the Chemical Society and the Society of Chemical Industry, with the object of co-ordinating and, if possible, unifying the abstracts hitherto published separately by the two Societies. The work of the Bureau is in the hands of a Committee consisting of four representatives from each Society, with Professor J. C. Philip as Chairman.

The Bureau was, at an early stage, called upon to deal with the position created by the resignation, through ill-health, of Mr. A. J. Greenaway, who was connected, for a long period of years, with the publications of the Chemical Society. His experience, fortunately, is at the disposal of the Bureau in its reorganisation of the production of abstracts. The Bureau has now arranged for a single homogeneous editorial staff, which will, in future, be responsible for the preparation and production of the abstracts both in pure and applied chemistry. The chief editor, who will be responsible for the organisation of the scheme and the general control of the abstracts, is Mr. T. F. Burton, who for the past nine years has been editor of the Transactions and Abstracts issued by the Society of Chemical Industry.

The further decision has been reached that the abstracts in each particular section should, as far as possible, come under the review of an Assistant-Editor, with special knowledge of the subjects covered by the section. The Bureau has, accordingly, appointed the following as Assistant Editors: H. M. Dawson (General and Physical chemistry), A. A. Eldridge (Inorganic and analytical chemistry), W. E. Garner (general and physical chemistry), H. J. Page (Biochemistry), E. H. Rodd (organic chemistry, aromatic division), A. Shonk (applied chemistry), E. E. Turner (organic chemistry, heterocyclic division), H. Wren (organic chemistry, aliphatic division).

It is felt that this move in the direction of securing unity in editorial and technical control represents a distinct step towards the achievement of the objects of the Bureau.

"The Chemists' Year Book"

The 1924 edition of the Chemists' Year Book has been issued in one volume. Though its 1,100 odd pages make it rather bulky in this form it is a distinct improvement in general convenience on the previous two volume arrangement. The editor, as before, is Dr. F. W. Atack, assisted by Mr. L. Whinyates, and the book is published by Sherratt and Hughes, 34, Cross Street, Manchester, at 21s. There are the usual complete tables of properties of various substances, analytical tables, and numerous other tables of interest and importance to chemical specialists. New sections have been added on Water Analysis, Essential Oils and Spirits, and many of the tables have been revised. Additional American data is given, which has been prepared by the Editorial Staff of the Chemical Catalog Company, New York, a useful feature to chemists coming in contact with American practice. With these alterations the present edition practically constitutes a new book, which should prove extremely valuable.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, February 28, 1924.

DURING the past week there has been a marked increase in the number of inquiries for small spot parcels, owing to the prolongation of the Dock strike, which, however, has now been settled.

At time of writing the amendment of terms of the German Reparations Recovery Act has just been published, but it is too early yet to say what effect this will have on the prices of imported materials, although the likelihood is that they will cheapen.

Up to the present the market both for spot and forward delivery has been fairly steady, and there is no change in price of importance to note.

Industrial Chemicals

ACID ACETIC.—Prices remain unchanged. Glacial, 98/100% £62 to £70 per ton; 80% pure, £51 to £53 per ton; 80% technical, £47 to £50 per ton, all packed in casks delivered, c.i.f. U.K. port, duty free.

ACID BORACIC.—Crystals or granulated, £48 per ton; powdered, £50 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Rather better inquiry and price inclined to harden. Now quoted 7¼d. to 7½d. per lb., carriage paid.

ACID CITRIC, B.P. CRYSTALS.—Further advance in price. Now quoted 1s. 5½d. per lb., less 5%, carriage paid.

ACID FORMIC, 85%.—Spot material now available at about £70 per ton, ex store. Offered for early delivery at about £67 per ton, ex wharf.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC.—Unchanged at 5½d. per lb., ex store. Little inquiry.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Moderate inquiry. Spot lots now quoted 1s. 1½d. per lb., less 5% ex store; offered for early delivery at about 1s. 0½d. per lb., less 5% ex wharf.

ALUMINA SULPHATE, 17/18%, IRON FREE.—Spot lots quoted £8 10s. per ton, ex store. Offered for forward delivery at about £7 15s. per ton, c.i.f. U.K. port.

ALUM CHROME.—Potash chrome alum quoted about £27 per ton, ex station. Ammonium chrome alum about £20 to £21 per ton, ex store. Moderate inquiry for export.

ALUM POTASH (LUMP).—Offered from the Continent at about £10 per ton, c.i.f. U.K. port. Spot lots quoted £10 15s. per ton, ex store.

AMMONIA ANHYDROUS.—Moderate inquiry with price inclined to be higher. Now quoted 1s. 5½d. per lb., ex station, prompt delivery.

AMMONIA CARBONATE.—Lump, £35 per ton; powdered, £37 per ton, packed in casks, carriage paid U.K. stations.

AMMONIA LIQUID, 880°.—Unchanged at 3d. per lb., delivered. Containers extra.

AMMONIA MURIATE.—Grey galvanisers' quality unchanged at about £30 to £32 per ton, ex station. Fine white crystals offered from the Continent at £27 per ton, c.i.f. U.K. port.

AMMONIA SULPHATE.—25¼%, £13 10s. per ton; 25¾%, £14 13s. per ton, ex works, prompt delivery.

ARSENIC, WHITE POWDERED.—Spot lots unchanged at about £70 to £71 per ton, ex store. Slightly cheaper offers for forward delivery. Quoted £67 to £68 per ton, ex wharf.

BARIUM CHLORIDE, 98/100%.—English material on offer at £14 10s. per ton, ex store. Offered from the Continent at about same price, ex wharf.

BARYTES.—Finest English white quoted £5 5s. per ton, ex works. Continental about £5 per ton, c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots £11 per ton, ex station. Contracts 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystal, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton, ex station. Offered from the Continent at about £4 15s. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Quoted £3 per ton, f.o.b. U.K. port, packed in casks.

COPPER SULPHATE.—In little demand. Price about £25 per ton, carriage paid or f.o.b. U.K. port.

FORMALDEHYDE, 40%.—Unchanged at £62 to £63 per ton, ex store, spot delivery.

GLAUBER SALTS.—English material £4 per ton, ex store or station. Continental offering at about £3 5s. per ton, c.i.f. U.K. port.

LEAD, RED.—English make unchanged at £41 per ton, less 2½%, carriage paid U.K. stations. Continental about £39 per ton, ex store, spot delivery.

LEAD, WHITE.—Continental material unchanged at about £43 per ton, ex store, spot delivery.

LEAD ACETATE.—White crystals now quoted £47 to £48 per ton, ex store, spot delivery; brown, about £45 10s. to £46 10s. per ton. White crystals offered from the Continent at about £46 per ton, c.i.f. U.K. port.

MAGNESITE CALCINED.—Finest English ground material offered at £8 per ton, ex station. Moderate inquiry for export.

MAGNESIUM CHLORIDE.—Quoted £3 10s. per ton, ex store, spot delivery. Offered from the Continent at about £3 5s. per ton, c.i.f. U.K. port.

MAGNESIUM SULPHATE (EPSOM SALTS).—Commercial quality offered at about £5 per ton, ex store. B.P. quality, £6 5s. per ton, ex station, prompt delivery.

POTASH CAUSTIC, 88/93%.—Continental offers advanced to about £29 10s. per ton, c.i.f. U.K. port. Spot lots still on offer at £32 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM CARBONATE, 96/98%.—Prices inclined to be higher. Offered from the Continent at £24 10s. per ton, c.i.f. U.K. port, prompt delivery. Spot lots on offer at £27 15s. per ton, ex store.

POTASSIUM CHLORATE.—Little inquiry. Spot lots unchanged at about 3½d. per lb., ex store.

POTASSIUM NITRATE (SALTPETRE).—Offered from the Continent at £25 10s. per ton, c.i.f. U.K. port, prompt shipment. Spot lots on offer at about £31 10s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Nominally 10d. per lb., ex store, but could probably be obtained for less.

POTASSIUM PRUSSIATE (YELLOW).—Quoted 8¾d. per lb., f.o.b. U.K. port for export. Spot lots about the same figure, ex station.

SODA, CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62% broken, £19 2s. 6d. per ton; 98/99% powdered, £22 15s. per ton. All ex station, spot delivery. Contracts, 20s. per ton less.

SODIUM ACETATE.—Unchanged at about £24 10s. per ton, ex store, spot delivery.

SODIUM BICARBONATE.—Refined recrystallised quality £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—English makers' price unchanged at 4½d. per lb., delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5s. 5d. per ton, ex quay or station. Alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English makers' price about £10 per ton, ex station. Continental obtainable at about the same figure. Pea crystals quoted £15 per ton, ex store.

SODIUM NITRATE.—Refined, 96/98% quality, quoted £13 10s. per ton, f.o.r. or f.o.b. U.K.

SODIUM NITRITE 100%.—Quoted £27 to £28 10s. per ton, according to quantity, f.o.b. U.K. port.

SODIUM PRUSSIATE (YELLOW).—Unchanged at about 5d. per lb., f.o.b. U.K. port for export. Spot material available at about 5¼d. per lb., ex store.

SODIUM SULPHATE (SALTCAKE).—Price for home consumption £4 5s. per ton, carriage paid stations. Good export inquiry.

SODIUM SULPHIDE.—60/62% solid, £15 per ton, ex station; broken, £1 per ton more; 31/34% crystals, £9 7s. 6d. per ton, ex station.

SULPHUR.—Flowers, £10 per ton; Roll, £9 per ton; Rock, £9 per ton; Ground, £8 per ton Prices nominal.

TIN, CRYSTALS.—Unchanged at 1s. 3d. per lb., f.o.b. U.K. port.

ZINC CHLORIDE 98/100%.—Quoted £2 per ton, f.o.b. U.K. port for export.

ZINC SULPHATE.—English material offered at about £13 10s. per ton, ex store. Continental at about the same figure.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHOL.—Good export inquiry. Price 2s. 5d. lb., f.o.b. casks included.

BINITROTOLUOL.—Good export inquiry. Price 1s. 0¾d. lb., f.o.b. casks included.

BETA NAPHTHOL.—Home and export inquiries. Price 1s. 1d. lb., delivered or f.o.b.

META XYLIDINE, DISTILLED.—Export inquiry. Price 8s. lb., f.o.b., drums included.

NITROBENZOL.—Price reduced at 6d. lb., f.o.b., drums included.

NITRONAPHTHALENE, REFINED.—Good export inquiry. Price 11d. lb., f.o.b.

PARA AMIDO ACETANILIDE.—Export inquiry. Price 5s. 2d. lb., 100% basis, casks included.

S.S. ACID.—Some export inquiry. Price 14s. 6d. lb., 100% basis, casks included.

Bradley Chemical Factory

APPLICATION was made on behalf of the War Office before the Railway and Canal Commissioners on Friday, February 22, for extension of occupation in connection with the Bradley Chemical Works near Huddersfield. For the Secretary of State, Mr. Giveen said it had been decided to buy out all the respondents, but a difference of opinion had arisen among those to whom different parts of the land belonged as to their portions. Holliday and Co., the Dyestuffs Corporation, and the railway company disagreed as to how much land belonged to each, and this difficulty had to be cleared up before the conveyance could be got through.

Major Henry McKenna said that Bradley was used for the manufacture of picric acid, and the Department had endeavoured to sell it to one of the dye factories. The negotiations, however, had broken down from time to time. The last time they broke down at the end of 1921. Twenty men had been employed since the middle of 1922 cleansing the land.

Mr. Justice Sankey expressed astonishment at the long time it had taken to do this work, but Major McKenna assured the Court that it was not possible for the safety of the men to do it in a shorter time. The work ought to be finished by the end of the present month.

The Court granted the application, fixing the period of occupation until August 30 next.

Optical Society: Election of Officers

AT the annual general meeting of the Optical Society, held at the Imperial College on Thursday, February 14, 1924, the following officers and members of Council were elected to serve for the year 1924–1925:—President: Emeritus Professor Archibald Barr, D.Sc., LL.D., F.R.S. Vice-Presidents: Sir Frank Dyson, M.A., D.Sc., LL.D., F.R.S., Mr. T. Smith, M.A., F.Inst.P., Inst.-Commdr. T. Y. Baker, R.N., B.A. Hon. Treasurer: Major E. O. Henrici, R.E. Hon. Secretaries: Professor Alan Pollard, Mr. F. F. S. Bryson, M.B.E., M.A., B.Sc. Hon. Librarian: Mr. J. H. Sutcliffe. Editor of "Transactions": J. S. Anderson, M.A., D.Sc., Ph.D. Council: Dr. J. S. Anderson, Mr. W. M. Brett, Professor F. J. Cheshire, Mr. R. W. Cheshire, Mr. W. B. Coutts, Mr. A. H. Emerson, Mr. H. H. Emsley, Mr. P. F. Everitt, Dr. J. W. French, Miss L. M. Gillman, Mr. J. Guild, Inst.-Lt.-Commdr. N. Langlands, Dr. L. C. Martin, Mr. F. C. Watts, Mr. A. Whitwell.

The Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, February 28, 1924.

THE market in chemicals here continues active, certainly up to the level of recent weeks, both on home and foreign account, and with the dockers' dispute settled the fears of a prolonged hold-up at the ports and a consequent dislocation of both import and export business are removed. On the import side of the trade the effect of the revision of the reparation duties on chemical products remains to be seen. It is highly probable, however, that prices of many German lines will be appreciably easier, as consumers in a number of instances have had to bear the cost of the considerably higher duty which the German Government has for some time refused to refund to exporters.

Heavy Chemicals

The demand for prussiate of soda is still on the quiet side, and values are easy at 5¼d. per lb. Inquiry for phosphate of soda is likewise restricted, but prices are unchanged at £13 10s. to £14 per ton. Foreign business in saltcake is maintained, with home users taking moderate quantities at £4 10s. per ton. Glauber salts are only a quiet section at £3 10s. per ton. Caustic soda is fairly active both for home consumption and for shipment, values ranging from £16 17s. 6d. per ton for 60 per cent. to £19 7s. 6d. for 76–77 per cent. material. Sulphide of sodium shows little improvement; 60–65 per cent. concentrated solid is offering at £14 10s. to £15 per ton, and crystals at £9. Hyposulphite of soda is quiet but steady at £14 15s. for photographic crystals and £9 10s. per ton for commercial. Bleaching powder is only in moderate demand, but values are steady at round £10 per ton. Bicarbonate of soda attracts only a small amount of buying interest at £10 10s. per ton. The demand for bichromate of soda is moderately good, with prices maintained at 4½d. per lb. Soda crystals keep steady and in fair inquiry at £5 5s. per ton. Home and export demand for alkali is maintained at recent levels, 58 per cent. material being quoted at £6 15s. per ton. Chlorate of soda is still rather quiet, but prices are unchanged from last week at 2¾d. per lb. The demand for nitrate of soda is not particularly strong, though quotations are firm on continued scarcity, to-day's price being round £28 10s. per ton. Acetate of soda is just a trifle dearer at £23 15s. per ton.

Carbonate of potash is in moderate demand at from £26 per ton according to strength. Caustic potash is quoted at about £30 per ton for 90 per cent. material. Permanganate of potash is selling quietly at from 8d. per lb. for commercial qualities. Yellow prussiate of potash is dull and easier than at last report at 8½d. per lb. Chlorate of potash is quiet but about unchanged at round 3d. per lb. Bichromate of potash continues steady at 5¾d. per lb.

Inquiries for arsenic are still being received though actual business at the moment remains quiet; prices are about unchanged from last week at £67 per ton, Manchester, for white powdered, Cornish makes. Sulphate of copper is inactive and values are easy at £24 10s. to £25 per ton, f.o.b. Commercial Epsom salts continue fairly steady at £4 10s. per ton, with magnesium sulphate, B.P., offering at about £6 10s. Acetates are in rather short supply. Grey acetate of lime is quoted at £21, with brown nominally £15 per ton. Acetate of lead is very firm at £48 for white and £46 to £47 per ton for brown. Nitrate of lead is maintained at £42 to £43 per ton.

Acids and Tar Products

Tartaric and citric acids are quiet at 1s. 1½d. and 1s. 4½d. to 1s. 5d. per lb. respectively. Oxalic acid is dull and prices are weak at 5¼d. per lb. Acetic acid is steady and in fair demand at £48 per ton for 80 per cent. commercial and £70 for glacial.

There has been a little more movement in some of the coal-tar products. Pitch is steadier and rather more active at round £3 per ton Manchester. Naphthalenes are quoted at £16 for refined and £6 per ton and upwards for crude according to quality. Creosote oil is in quietly steady demand at about 9d. per gallon. Carbolic acid has recovered some of its strength, though quotations are not materially altered from last week, crystal being quoted at about 8d. per lb. and crude at 2s. per gallon.

Company News

LAUTARO NITRATE CO. LTD.—The directors have declared an interim dividend on account of the year 1924 of 5 per cent., or 5s. per share, payable on March 1 to shareholders on the register at the closing of the books on February 25 and to holders of share warrants Coupon No. 55.

VICKERS, LTD.—The directors announce the payment on March 31 of final dividends for the half-year ended December 31 at the rate of 2½ per cent. on the preferred 5 per cent. stock, less tax, 2½ per cent. on the 5 per cent. preference shares, less tax, and 2½ per cent. on the cumulative preference shares (free of tax).

WILLIAM GOSSAGE AND SONS.—The accounts for the year to November 30 last show, after providing for all charges, a balance at the credit of profit and loss of £174,826. After paying the preference dividends the directors recommend a dividend of 20 per cent. on the ordinary shares, leaving £3,576 to be carried forward.

CANADA CEMENT CO.—The accounts for 1923 show an income after making provision for depreciation, of $2,235,439, and $653,158 was brought in, making a total of $2,888,597. Bond interest absorbed $343,592, fire insurance $40,455, contingent reserve $190,000, reserve for extraordinary repairs and renewals $40,000, industrial accidents $24,000, and dividends —preference stock $735,000, ordinary stock $810,000, leaving a surplus of $705,550.

ALEXANDER, FERGUSSON AND CO.—The profit for the year 1923, after deducting the usual charges, was £18,556, to which is added the balance brought forward £7,259, making a total of £25,815. The directors have placed £4,000 to depreciation, and transferred £3,000 to the reserve fund, and recommend a dividend on "A" and "B" ordinary shares of 12½ per cent. per annum and a bonus of 5 per cent., both less tax, carrying forward £6,631. Meeting, 50, Ruchill Street, Maryhill, Glasgow, March 4, at 11.15 a.m.

HARRISON, BARBER AND CO.—The accounts of this company for the year ended December last show net profit of £8,742, making, with £1,533 brought forward, £10,275, out of which the interim dividend at the rate of 5 per cent. per annum, amounting to £3,250, was paid in July last, leaving a balance of £7,025. Out of this the directors propose to write off £1,000 for depreciation and to recommend a dividend of 7 per cent. for the half-year ended December (making 6 per cent. for the year, same as the previous year), which will absorb £4,550, and to carry forward £1,475.

COURTAULDS, LTD.—The profits for 1923, after charging taxation and the usual depreciations and expenses, and after carrying £400,000 to a special reserve for insurance, amount to £2,916,950. The directors have decided to carry £1,000,000 to general reserve; to recommend a final dividend for 1923 of 1s. 9d. per share, free of tax, and to carry forward £753,849. The interim payment was 6¼ per cent., making with the final dividend 15 per cent. for the year. It is, in the directors' opinion, desirable to strengthen the reserves in view of increasing foreign competition. The dividend will be payable on March 13, to holders on the books of the company on February 22.

YORKSHIRE INDIGO SCARLET AND COLOUR DYERS, LTD.—At the annual meeting held at Leeds on Friday, February 22, the chairman of directors, Mr. Phillip Marsden, pointed out how difficult business had been during the past year, owing to the pressure for reduction in prices. He said the year had been a long struggle, the early part gave promise of gradually improving trade, and a return, in some measure, to a more stable state of things, but the political and social unrest step by step had weakened the growing confidence of the traders, and the higher prices for raw materials steadily brought back the difficult and less favourable trading conditions. He hoped, however, that the shareholders would agree that the result of their trading, which enabled them to pay a 7½ per cent dividend, and to carry forward £358 more than last year, was a very satisfactory one.

Tariff Change

BELGIAN CONGO.—Under a new tariff various import duties have been increased, including soap, from 10 to 15 per cent., and artificial silk from 10 to 20 per cent. *ad valorem*.

Contracts Open

Tenders are invited for the following articles. The latest dates for receiving tenders are, when available, given in parentheses:

LIVERPOOL (March 11).—Pitch and creosote oil; oils and paints; disinfectants—carbolic acid and powder. Further particulars from the City Engineer, Municipal Buildings, Dale Street, Liverpool.

TEDDINGTON (March 3).—Supply and delivery of distilled tar, ferric sulphate, sulphate of alumina, portland cement and lime. Forms of tender may be obtained from Mr. M. Hainsworth, Council offices, Teddington.

KILMARNOCK.—Supply of alumina and chalk suitable for use in water purification in connection with the Paterson rapid filtration plant at Amlaird, Fenwick. Further particulars may be obtained from Mr. W. Dunbar, water engineer, Kilmarnock.

CHILE (March 28).—Boiled linseed oil, turpentine, carbide of calcium, paint, varnish, etc., required by the Arica-La Paz Railway. Further particulars may be obtained on application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. (Reference No. D.O.T. 9388/F.L./G.C.)

NEW ORLEANS.—H.M. Consul-General at New Orleans reports that a local firm is desirous of receiving quotations for the following chemical products:—Fine chemicals: Iodine, potassium iodide, sodium iodide, potassium bromide, sodium bromide, and other fine chemicals. Heavy chemicals: Epsom salt, carbonate of soda, chloride of lime, calcium chloride, bicarbonate of soda, cream of tartar, citric acid, etc. Firms in a position to supply British products as specified can obtain further particulars from the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. (Reference D.O.T. 21940/F.W./C.C./2.)

CHILE.—The Department of Overseas Trade has received from the Chilean State Railways a series of specifications of the following materials and stores that are purchased by them from time to time:—Portland cement, calcium carbide, soda, potash, liquid ammonia, camphor, cyanide of potassium, alcohol, pure and denaturalised, borax, pitch, tar. The specifications, which are printed in Spanish, and which are for future guidance, will be forwarded on loan for inspection to interested British firms in order of application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. The reference number 6720/F.L./G.P. should be quoted.

"Chemical Age" Inquiry List

The following inquiries have been received from readers of "The Chemical Age." Replies addressed to the box number given below, c/o "The Chemical Age," 8, Bouverie Street, London, E.C.4, will be forwarded to the inquirers.

Makers or suppliers of aluminium hydrosilicate for oil refining.—H. 37.

Suppliers of acid-protecting coating known as "Solzol."—H. 38.

Reduced Prices for Mercurials

MAY AND BAKER, LTD., manufacturing chemists, of Battersea, London, S.W., in announcing new reduced prices for mercury salts, draw attention to the advantage in use of granular corrosive sublimate over the powdered article, which latter soon becomes lumpy on keeping, rendering exact weighing difficult, whereas the granular form retains its free-running granular condition indefinitely. The price of the granular is the same as powder, and it is cheaper than lump corrosive sublimate. The firm will be pleased to submit a sample of granular corrosive sublimate to those interested for comparison.

The following are the new prices for assorted lots or contracts:—

MERCURY.	Under 112 lb.	Not less than 112 lb.
Ammoniated Lump B.P. (White precip.)	4/2	4/1 lb.
,, Powder	4/3	4/2 ,,
,, extra fine Powder ..	4/4	4/3 ,,
Bichloride Lump B.P. (Corros. sub.) ..	3/1	3/– ,,
,, Powder or Granular ..	2/11	2/10,,
Chloride B.P. (Calomel)	3/6	3/5 ,,
Red Oxide Cryst. B.P. (Red precip.) ..	4/10	4/9 ,,
,, ,, Levig B.P.	4/4	4/3 ,,
Yellow Oxide	4/2	4/1 ,,

The above prices are net, and without engagement, on the usual terms. Special prices can be quoted for larger quantities.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

AJAX MANUFACTURING CO., LTD., 62A, Loughborough Road, Brixton, paint manufacturers. (C.C., 1/3/24.) £12 14s. 2d. January 10.

RUSH, Herbert William, 115, Midfield Road, Crookes, Sheffield, chemical fertiliser manufacturer. (C.C., 1/3/24.) £13 9s. 6d. January 10.

UNITED LABORATORIES AND CHEMICAL CO., LTD., 97, Queen Victoria Street, E.C. (C.C., 1/3/24.) £30 15s. 6d. December 29.

YOUNG, George (a firm), Morpeth, soda water manufacturers. (C.C., 1/3/24.) £60 10s. 2d. December 12.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

ANGLO-PERSIAN OIL CO., LTD., London, E.C. (M., 1/3/24.) Registered February 18. Trust deed dated February 14, 1924 (supplemental to Trust Deed dated May 25, 1909, and indentures supplemental thereto), securing £7,500,000 inclusive of £5,000,000 secured by principal indentures redeemable at a premium of 5 per cent.; general charge. *£4,500,000. December 31, 1923.

BERRY, WIGGINS AND CO., LTD., London, E., manufacturing chemists. (M., 1/3/24.) Registered February 6th, mortgage, to Bank; charged on Halling Wharf, Channelsea Road, Stratford. *Nil. June 1, 1923.

KEY PRODUCTS, LTD., London, E.C., chemical manufacturers. (M., 1/3/24.) Registered February 13, £500 debentures (filed under section 93 (3) of the Companies (Consolidation) Act, 1908), present issue £100); general charge; also registered February 18, £50 and £50 debentures, part of £500; general charge.

NATIONAL FUEL OIL CO. (1921), LTD., London, W.C. (M., 1/3/24.) Registered February 7, £17,950 debentures, part of £30,000; general charge. *£100. January 13, 1924.

ORGANAM, LTD. (late ELSTREE CHEMICAL WORKS (1922), LTD.). (M., 1/3/24.) Registered February 9, £500 second debenture, to Mornington Trust, Ltd., 54, New Broad Street, E.C.; general charge (subject to prior debenture).

PREMIER DYEING AND FINISHING CO., LTD., Leek. (M., 1/3/24.) Registered February 13, £6,000 debentures, part of £25,000; charged on Premier Works, Tittesworth, Leek, and Knight Street Works, Macclesfield; also general charge. *£14,000. June 22, 1923.

SALAMON AND CO., LTD., Rainham, chemical manufacturers. (M., 1/3/24.) Registered February 12, £40,000 debenture, to Bishopsgate Nominees, Ltd., 15, Bishopsgate, E.C.; general charge. *Nil. June 1, 1923.

SERRE (ACHILLE), LTD., London, E., dyers. (M., 1/3/24.) Registered February 6, debenture, to bank; general charge. *Nil. March 28, 1923.

Satisfaction

YOUNG JOHN (OF RADCLIFFE), LTD., bleachers, etc. (M.S., 1/3/24.) Satisfaction registered February 13, £3,000, part of amount outstanding July 1, 1908.

London Gazette

Companies Winding Up Voluntarily

AMERICAN COTTON OIL CO., LTD. (C.W.U.V., 1/3/24.) J. A. Roney, 5, London Wall Buildings, London, appointed Liquidator. Meeting of creditors at 5, London Wall Buildings, on Friday, March 7, at 12 noon.

MAGADI SODA CO., LTD. (C.W.U.V., 1/3/24.) A. W. Tait, C.B.E., of Basildon House, Moorgate, E.C.2, appointed Liquidator.

Partnership Dissolved

BENSON, DUNLOP AND CO. (PARTON, Frank William, and DUNLOP, Frank), "Chemical and Oil Merchants," South Garden Street, Bury by mutual consent, as from December 8, 1923. Debts received and paid by F. W. Parton, who will continue the business in the name of Frank W. Parton and Co., successors to Benson, Dunlop and Co.

New Companies Registered

FL. BOURGEOIS (GUMS), LTD. Dealers in varnish, shellac, gums and other similar products, etc. Nominal capital, £1,000 in £1 shares. Solicitors: Swepstone, Stone, Barber and Ellis, Broad Street House, New Broad Street, London, E.C.

DISABLED SOLDIERS' MANUFACTURING CO., LTD., 2, 4 and 6, Bury Street, Bolton. Import and export merchants, dealers in all kinds of salts, acids, alkalis, chemical materials, etc. Nominal capital, £1,000 in £1 shares.

HEPPELLS, LTD., Spencer House, South Place, London, E.C.2. Wholesale and manufacturing chemists, etc. Nominal capital, £250,000 in 150,000 7 per cent. cumulative participating preference and 95,000 ordinary shares of £1 and 100,000 ordinary shares of 1s.

INTERNATIONAL SUGAR AND ALCOHOL CO., LTD., Kinnaird House, 2, Pall Mall East, London, S.W.1. To acquire the benefit of any secret or other processes for the manufacture of sugar, alcohols or other articles or substances, etc. Nominal capital, £251,000 in 1£ shares (51,000 "A" and 200,000 "B").

VIKING PAPER CO., LTD., 83, Cannon Street, London, E.C.4. Paper agents and merchants, makers of pulp, paper, wax, etc. Nominal capital, £5,000 in 4,000 6 per cent. cumulative preference shares of £1 each and 20,000 ordinary shares of 1s. each.

Victoria Syndicate

THE Victoria Syndicate, Ltd., was registered on February 21 as a private company, with a nominal capital of £270,000 in £1 shares. The objects are: to search for, prospect, examine and explore lands for ores, metals, minerals, oils or other substances, including auriferous or other precious metals and precious stones, to acquire mines, mining rights, and metalliferous land or any interest therein; and to carry on the business of manufacturers, crushers, refiners, miners and smelters of and dealers in nickel, copper and other ores, metals, bullion, specie, precious metals and stones, chemicals and oils; engineers, ironmasters, steel makers and converters, etc.

Holders of shares No. 1–135,000 shall be known as "The Mond Group," and holders of shares No. 135,001–270,000 as the "Central Mining Group." The first directors are:—Rt. Hon. Sir Alfred M. Mond, Bt. (chairman), Henry L. Mond, M.P., Philip Mond, Carl Langer, jun. (known as "Mond Group Directors"), and Sir Lionel Phillips, Bart. (deputy chairman), Sir Reginald S. Holland, Bt., Felis Heim, and John L. Bergson (known as "Central Mining Group Directors").

Qualification: £1,000 shares. Remuneration: £300 each per annum (£100 extra for chairman) and 5 per cent. of the balance standing to the credit of the "Profit and Loss Account" for each year before deducting such remuneration (to be divided into moieties between the Mond Group and Central Mining Group.) Solicitors: Kenneth Brown, Baker, Baker, Lennox House, Norfolk Street, W.C.